The
CHEMICAL AGE

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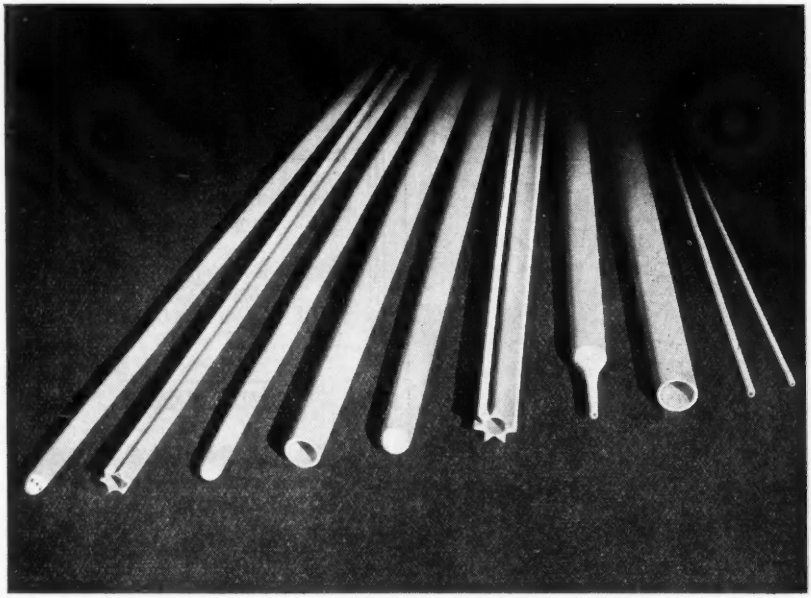

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More Coal—in 1965

A COMMENTARY on what has come to be known simply as "the coal problem" which seems more illuminating than any of the "authoritative" reports recently offered was presented before the Royal Society of Arts a few days ago by two who have studied the economics of British coal mining more closely than almost anyone else. They are Sir Charles Reid, author of the Reid Report, whose resignation of the office of production member of the National Coal Board last year caused widespread speculation whether the present national coal programme was a practical proposition, and Dr. William Reid, his son, who continues to serve as production director of the Scottish division of the National Coal Board. This collaboration was admitted to have necessitated "a certain adjustment of their separate views on the subject." That willingness to compromise may be taken as a measure of their estimation of the importance of a more realistic policy for efficient coal-getting.

This, the Cadman Lecture, seems to have presented for the first time, shorn of partisanship, a balanced summary of what is needed to re-establish conditions of higher production and lower costs without the social upheavals which might follow if the obvious measures of reducing wages and closing uneconomic pits were generally adopted. Their conclusion is, not surprisingly, far less optimistic than the estimate which pronouncements by some official spokesmen for the industry may have encouraged. They believe that it will require 15 years' intensive reorganisation—of mechanisation, manpower economy and labour efficiency—to expand production on a scale to permit a reduction of present coal prices of five shillings a ton. The chemical, and other industries intimately dependent on coal will not find this a cheering document. Responsible opinion long ago rejected the existence of any sovereign remedy for the relative shortfall of mine production and the Cadman lecturers have left no grounds for reviving the myth.

All mines differ in material respects, and especially in the amount of labour required to raise a given quantity of usable coal. More and more are we becoming dependent upon the yields of deep mining—at over 2000 feet in many cases—and mechanised coal cutting alone, according to this report, will not sensibly lighten the heaviness of the task. Average output per manshift in the third quarter of 1948 was 21.8 cwt., so that the production of 1000 tons of coal required 916 manshifts (345 at the face, 345 elsewhere underground and 226 on the surface). Mining engineers foresee that it will require 15 years to raise the basic figure to 30 cwt. per manshift, and even then will call for an enormous task of manpower reorganisation. In the interval the

On Other Pages

closing of uneconomic pits will have reduced considerably the total number of producers, the contributors of the present survey point out. The mechanisation which will help most to make good the many marginal losses is represented by power loading and conveying, rather than cutters at the face, and a mobile conveyor which can be quickly adjusted to the changing face would contribute very largely to achieving the general objective. Transport, requiring over 200 manshifts out of the 345 worked underground, other than at the face, per 1000 tons, urgently needs to be simplified. The NCB is fortunately said to be keenly aware of this.

These are among the physical considerations to which Sir William and Dr. Reid have directed attention. There remains a deeper problem not susceptible to a mechanical solution—the attitude of the individual miner towards his job. That is recognised in the lecturers' observation that, "with a national problem of full employment there is an added responsibility on labour to appreciate its obligations as opposed to its rights, but it will take time to make it generally understood that regular attendance at work is an essential part of a full employment policy . . . Since vesting date, the NCB has gone a very long way in an endeavour to show its sincere desire to raise the status of the miner and to gain the confidence of leaders and rank and file; but it can hardly be said that this has been fully appreciated. A new loyalty to the industry and to the individual colliery similar to that existing in certain parts of the coalfield must be cultivated." Here and in several other passages the lecturers have stressed the importance of good relations between the men on whom the ultimate production of another 5 cwt. per shift depends and their new leaders. That ideal is conspicuously far from being realised, as a resolution passed this week by the National Union of Mineworkers in Yorkshire bears witness. They demand a full inquiry into the administration of the industry, because, says their president, while they are pledged to improve coal output, they are "dismayed" at the large number of officials and staff employed unnecessarily in administration.

Coal Output.—Although deep-mined coal production in Britain fell by 16,000 tons last week, compared with the previous week, opencast output increased by 36,300 tons, making a rise in the total production of 20,300 tons. Comparative figures are: Last week: 4,112,1000 tons deep-mined, 239,100 tons opencast, 4,351,200 tons total. Previous week: 4,128,100 tons deep-mined, 202,800 tons opencast, 4,330,900 tons total. In the week ended March 20, last year, 4,308,800 tons were raised.

NOTES AND COMMENTS

Rush Tactics

NOTHING has undermined more completely any remaining confidence in the Government's qualifications to take over and competently direct the iron and steel industry as a long-range project than the indecent haste which marked the concluding session, last week, of the Standing Committee on the Iron and Steel Bill. The principles which permitted the measured to be whisked out of range of any further discussion while 34 of its 58 clauses had not been considered savoured more of the tactics of a smash-and-grab raid than of far-seeing legislation. The result tends to confirm the unhappy suspicion that the sponsors of the Bill are too dazzled by the prize to care overmuch how it is come by. That, if true, holds out poor prospects for the continued orderly development of the industry if the Iron and Steel Bill becomes effective. Notwithstanding the warm acknowledgments extended by the Minister of Supply to the constructive contributions of the Opposition members of the committee, the Bill stands condemned as partisan legislation pressed through, it would appear, largely on the unchalleneged recommendations of the Supply Minister himself. It has been reliably calculated that one-third of the entire time devoted to the Bill by Government speakers was filled by Mr. G. R. Strauss. U.S. Congressmen use organised loquacity to "talk out" a Bill. The Supply Minister has succeeded in putting filibustering into reverse.

Speculative Research

THE Lancashire town of Widnes has been associated with the manufacture of chemicals for over 100 years, and has the distinction of being the place where heavy chemicals in this country first took coherent form as a distinctive industry. There was, of course, heavy chemical production elsewhere prior to that date, but here the early roots struck and remained, widening ever since. In 1847 what is believed to have been its first chemical works was erected by John McClellan, at Lugsdale, for the manufacture of borax; that was the North British Chemical Company. McClellan was soon followed by other pioneer manufacturers of various chemicals, and there grew up a vigorous industry, which to-day also includes among its manufactures fine and medicinal chemicals, insecticides, fertilisers and metallurgical products, the latter embracing, in very recent times, the uranium for the atomic pile at Harwell.

Continuing Quest

FOR its continued vigour and ability to keep abreast of scientific advance and new techniques, the chemical industry of Widnes owes much to local industrial research over the past 58 years, and it has now received fresh impetus through the reopening of the laboratories of the General Chemical Division of Imperial Chemical Industries, which have been reconstructed after war damage, modernised and considerably extended. This, 58 years ago, not only was a pioneer in Widnes but, it is thought, may well have been the first *industrial* research laboratory anywhere in the world. It is on record that Dr. Ferdinand Hurter, first chief chemist of the United Alkali Company, in whose mind the idea of the Widnes laboratory originated—that was in 1891—conceived its duties to be "original research in general to promote the interests of the company." To-day the functions of this ultra-modern establishment are still largely "original research," or, as it was made clear at the reinvigorated laboratory's house-warming last week (pp. 444-446, this issue), "research of a speculative nature." Speculative is the operative word in this context. Without a measure of such willingness to wager some of the great rewards of industry against the prospects of new knowledge the hope for the future of chemical industry, perhaps for the country at large, would be far less bright.

Safety Campaign

THE relative safety of chemical processes, to which the small number of casualties recorded in the monthly official returns testifies, is not easily explained. Fire, explosion, asphyxia and toxæmia are potentialities lying not far below the surface in many chemical plants, and only unremitting watchfulness keeps them in bond. Recognition of how vital it is that

this vigilance should be intensified at least as swiftly as chemical industry itself expands is being fostered very effectively by a relatively small group, to which new adherents may have been recruited at the discussion held last week under the auspices of the Oil and Colour Chemists' Association in collaboration with the safety officer of the Association of British Chemical Manufacturers, Mr. A. Webster (page 451 this issue). Here once more was recalled the most refractory difficulty underlying all others, the refusal of the man in the works, and occasionally of the laboratory worker, to abide by the rules as faithfully as do the inanimate components of chemical industry. How—it was asked by the chairman, Mr. David E. Roe—are operatives to be deterred from wearing face masks under the chin and goggles on the forehead—without using a pistol? The safety officer admits there is no infallible means of enforcing personal safety rules. The provision by one company of six different types of goggles for their workers to choose from had not solved the problem, and managements may be justified in making the proper use of safety appliances a condition of employment. The case for appointing whole-time safety officers becomes increasingly convincing.

Crystal Growth

THE increasing interest in the growth of large crystals for various industrial purposes is obviously one of the considerations which have moved The Faraday Society to arrange a general discussion on this subject at Bristol between April 12-14. Among those who will take part are Dr. Stockbarger, of Cambridge, Mass., well known for his success in growing large crystals of alkali halides for optical purposes, and Dr. Holden, of the Bell Telephone Laboratories, who has grown large piezo-electric crystals of ammonium dihydrogen phosphate and other substances from solution. Prof. Wyart, of Paris, Dr. Wooster, Dr. van Praagh and others will discuss the hydrothermal synthesis of quartz. Several papers on the influence of impurities on the habits of crystals grown from solutions will be read, and the discussion will also cover the theory and kinetics of normal crystal growth. The pervasive influence of nuclear physics appears in a paper to be read by Dr. F. Seitz on the disordering of solids by the action of fast massive particles. The Faraday Society is to be congratulated for its appreciation of the wide interest which a discussion of synthetic crystals will arouse.

Uranium Deposits Sought : Ministry's 10-Year Offer

TO stimulate the discovery and exploitation of uranium deposits, particularly in the colonial territories, the Ministry of Supply has offered to buy all ores and concentrates and, in certain circumstances, to assist mine development and primary processing by making capital payments.

The offer applies equally to the United Kingdom, although chances of discovering uranium here are considered slight, as this country has already been more completely surveyed than any other.

The search for radioactive minerals in the self-governing countries of the Commonwealth is already being actively pursued. Geiger-Muller counters produced in Great Britain are being used, and made increasingly available in the colonies. Samples brought in by prospectors are being analysed, and advice given by Colonial Geological Surveys and the Geological Survey of Great Britain.

To encourage interest among colonial mining houses and prospectors the Ministry of Supply has offered to take all uranium ores and concentrates produced in the colonial empire during the next ten years at a minimum price of 13s. 9d. per lb. of uranium oxide, delivered f.o.b. ocean port. Ore or concentrates must contain not less than 10 per cent uranium oxide and purchase cannot be guaranteed for lots less than ten tons. The Ministry of Supply, Division of Atomic Energy, Shell Mex House, London, is the authority dealing with uranium concentrates and is willing to discuss also the possibility of purchasing thorium containing minerals.

Uranium in Florida.—The presence of uranium in the "land pebble" phosphate deposits of Florida has been the subject of a study by a U.S. Geological Survey field party since 1947. Speaking at a symposium on south-eastern mineral resources sponsored by the University of Tennessee recently, Mr. J. B. Cathcart, a well-known U.S. geologist, declared that there are about 2.8 million square miles containing phosphate deposits with possible uranium content.

CHEMICAL EXPORTS FALL

Most Totals Below January's High Level

EXPORTS of products of the U.K. chemical industry in February were of substantially less value than those of January, the comparative figures being January £8,212,770, February £6,737,432. They were, however, well in excess of February 1948 (£5,706,340). Typical decreases are salicylic acid and salicylates £20,176 from £28,605 in January; ammonia sulphate £245,697 (against £538,650); bleaching powder £38,432 (compared with £67,328); tar oil exports £29,419 (£233,419); fertilisers £32,728 (62,328); lead acetate £37,508 (£63,051); sodium carbonate £230,551 (£301,363); sodium silicate £14,995 (£28,847); quinine and its salts £30,721 (£62,469); acetyl-salicylic acid £20,513 (£69,062); plastic materials £388,476 (£497,384). Nearly all these items, however, showed better results than in February, 1948. Some of the individual categories of exports and imports are shown in the accompanying tables.

CHEMICAL EXPORTS

	Feb., 1949	Feb., 1948
	Cwt.	Cwt.
Formic acid	1,641	2,912
	Lb.	Lb.
Salicylic acid and salicylates	147,471	124,635
Value of all other sorts of acid	£79,754	£69,663
	Tons	Tons
Aluminium oxide	1,094	50
Sulphate of alumina	2,866	2,327
All other sorts of aluminium compounds	326	394
Ammonium sulphate	14,792	16,807
Ammonium nitrate	10,107	7,884
All other sorts of ammonium compounds	1,654	576
	Cwt.	Cwt.
Bleaching powder	34,799	22,351
All other bleaching materials	10,214	7,021
	Gal.	Gal.
Cresylic acid	120,918	205,827
Tar oil, creosote oil, anthracene oil, etc.	440,021	1,359,474
Value of all other sorts of tar oil	£22,055	£17,802
	Cwt.	Cwt.
Collodion cotton	2,283	2,515
	Tons	Tons
Copper sulphate	1,962	6,250
	Cwt.	Cwt.
Disinfectants, insecticides, etc.	37,845	60,441
	Tons	Tons
Fertilisers	2,192	2,126
	Cwt.	Cwt.
Nickel salts	3,195	4,802
Lead acetate, litharge, red lead, etc.	5,914	4,901
	Gal.	Gal.
Tetra-ethyl lead	92,217	23,767
	Tons	Tons
Magnesium compounds	751	613
	Gal.	Gal.
Methyl alcohol	13,440	419
	Cwt.	Cwt.
Potassium compounds	6,528	5,817
	Tons	Tons
Salt	13,665	10,356
	Cwt.	Cwt.
Sodium carbonate, etc.	324,348	228,540
Caustic soda	149,758	183,755
Sodium silicate	18,897	5,070
Sodium sulphate	48,315	3,663
All other sodium compounds	60,802	52,219
Cream of tartar	201	1,386
Tin oxide	327	998
	Tons	Tons
Zinc oxide	1,176	1 089
Total value of chemical manufactures, excluding drugs and dyestuffs	£3,400,362	£3,295,859
Quinine and quinine salts	Oz. 143,095	Oz. 128,942
	Lb.	Lb.
Acetyl-salicylic acid	81,488 100	28,097 100
	International units	International units
Insulin	1,198,804	998,287
	Mega units	Mega units
Penicillin	429,887	295,319
Total value of drugs, medicines and preparations	£1,368,308	£1,053,852
Total value of dyes and dyestuffs	£1,002,767	£499,739
	Cwt.	Cwt.
Plastic materials	30,224	30,354
Value	£388,476	£339,531
	Cwt.	Cwt.
Chemical glassware	1,149	1,420
Value	£43,167	£41,978
	Cwt.	Tons
Fans	5,027	96
Value	£132,763	£62,639
	Cwt.	Tons
Furnace plant	5,401	615
Value	£59,279	£97,250
	Cwt.	Tons
Gas and chemical machinery	21,050	780
Value	£250,931	£147,077

CHEMICAL IMPORTS

	Feb., 1949	Feb., 1948
	Cwt.	Cwt.
Acetic acid	—	22,302
Boric acid	4,868	800
All other sorts	5,134	2,552
Borax	20,700	5,206
Calcium carbide	7,377	13,892
Coal tar products, excluding benzol and cresylic acid	10,227	9,477
Cobalt oxides	991	649
	Tons	Tons
Arsenic	19	155
Fertilisers	14,090	20,469
	Lb.	Lb.
Iodine	—	132,100
	Cwt.	Cwt.
Potassium chloride	459,259	529,412
Potassium sulphate	54,360	50,700
All other potassium compounds	9,512	3,121
Sodium nitrate	—	139,547
All other sodium compounds	4,582	4,532
Carbon blacks (from natural gas)	83,497	62,461
Total value of chemicals, drugs, dyes and colours	£2,217,631	£2,023,147

58 YEARS OF CHEMICAL RESEARCH

Re-Opening of I.C.I. Widnes Laboratory

THE official opening on March 16 of the reconstructed and much extended research laboratory of the General Chemical Division of Imperial Chemical Industries, Ltd., at Widnes, Lancashire, coincided with the completion of 58 years of chemical research there.

It is considered likely that the Widnes laboratory may have been the first purely industrial research establishment in the world. Its history dates from 1891, a year after the leading Leblanc manufacturers—about 50 in number—had banded together to form the United Alkali Co., Ltd., in face of what was then the new ammonia-soda process operated by Brunner, Mond & Co., which threatened their independent survival.

The Pioneer

The idea of the laboratory originated with the eminent Dr. Ferdinand Hurter, the first chief chemist of the United Alkali Company, who urged that its function should be "original research in general to promote the interests of the company." That fundamental purpose is to-day abundantly fulfilled in the work being carried on in the various laboratories at Widnes, the rebuilding and repair of which, necessitated by enemy bombing, has just been completed.

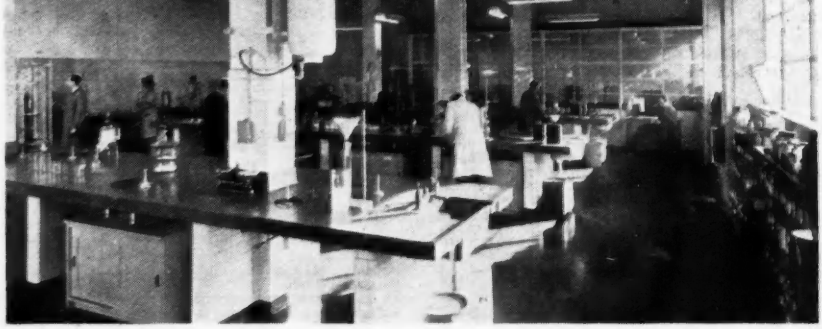
The opportunity to modernise the laboratory and to install advanced types of equipment and apparatus—offered originally by the need to repair bomb damage—has been well used, to produce a centre of chemical and scientific research embodying many new principles in design and equipment.

The Widnes laboratory services every branch of the General Chemicals Division. Among outstanding chemical products that emanated from it in the days before the second world war are Alloprene chlorinated rubber, Cereclor plasticiser for modern paints and plastics, and the Perenox agricultural fungicide.

During the war the laboratory took a large share in research into all forms of chemical warfare, and developed and operated process for the supply of many key chemicals of which the country was deprived. Part of the Widnes staff was also intimately engaged in atomic research during the war. Their outstanding contribution was to the production of uranium metal and of uranium hexafluoride, which helped to lay the foundation of the analytical chemistry of uranium.

Here also were developed during the war a number of other processes and products—the vinyl chloride process, Gammexane and Methoxone—research into some of which is still going on.

More recently, the laboratory has been engaged with the fluoro-chloro-methanes, previously imported under the name of "freons," and polytetrafluoroethylene, which is being produced by the division on



Seventy-five years ago this building was part of a soda crystal shed. To-day it is the largest chemical laboratory in Widnes

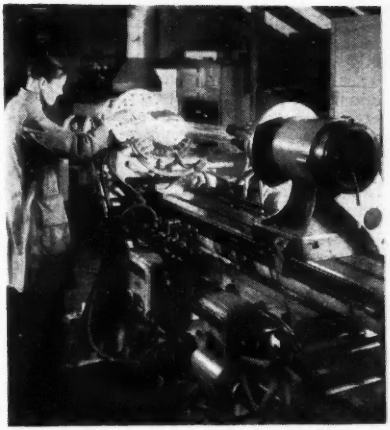
a semi-commercial scale. (THE CHEMICAL AGE, *60*, 10-14.)

Features of this research department—which was the scene of a reception on March 16—are many excellently equipped chemical laboratories, large and small, some fitted for specialised work, others of general utility. One noticed particularly the special installations for handling toxic substances, necessary in view of the properties of many of the materials handled by this division.

These laboratories also bring prominently to mind the diversity of science and technique which the chemical industry to-day employs, evidenced by the presence of highly qualified physicists, electronic experts, metallurgists, mechanical and electrical engineers, draughtsmen, fitters, plumbers, welders, joiners, tool makers, instrument makers, glass blowers, electricians, chemical process operators, micro- and macro-analysts, spectroscopists, X-ray spectroscopists, librarians, biologists, microscopists, and many others, all specialists in their particular sphere.

This small army of scientists, technicians and craftsmen at Widnes to-day numbers 500, and all are exceptionally well provided with the latest scientific aids.

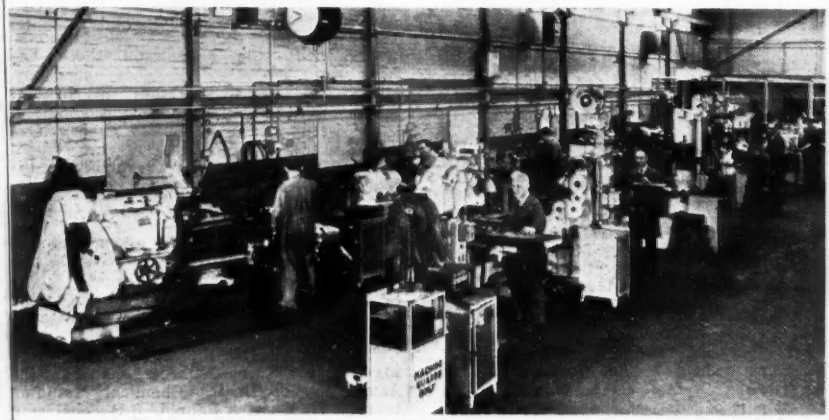
This equipment includes, for example, an electron microscope capable of a magnification of 50,000. Then there is a mass spectrometer, designed and built entirely at the laboratory, for the weighing of atoms and molecules, and a variety of analytical tools for determining the structures of materials, including ultra-violet and infra-red spectrometers, and the latest types of demountable



In the glass-blowing department at Widnes, which is the source of much of the specialised apparatus used in the research laboratories

X-ray tube with an X-ray spectrograph. Among the small power instruments is a centrifuge operating at 4000 r.p.m., and a microid flask shaker.

The division has installed modern metallurgical testing equipment. Then there is a very complete technical and scientific library of some 10,000 volumes employing simplified systems for abstracting and filing technical information.



A measure of self-sufficiency is provided by this workshop where equipment for the semi-technical and pilot plants of the I.C.I. General Chemicals Division is made

It is recognised that this represents only a start, as the Widnes laboratory is still growing, and its scientific staff is consistently being built up from the supply of science graduates who have attained distinction. As an additional recruiting source, there is a well-developed system for the training of juniors who enter the establishment straight from secondary schools. Each September a group of boys and girls is selected to receive nine months' full-time training in chemistry, physics and laboratory techniques before starting productive work. During this period they are fully-paid members of the company's staff.

Comprehensive Courses

The training is normally carried out in conjunction with the Widnes Municipal Technical College, a development in which Widnes has led the country. Special attention is paid to training in safety measures, and everything possible is done to start the young people on a course calculated to ensure that they qualify. The aim is to enable all to obtain ultimately A.R.I.C. or External B.Sc. degree, and there are many avenues of promotion within the company for those who do.

The subject of safety measures is intimately associated with the extreme cleanliness noticeable in every section of these laboratories, in addition, of course, to the complete sets of safety equipment to be found in each of the rooms.

The official opening ceremony was performed by the Mayor of Widnes, Councillor T. E. Gilbody. After lunch in the staff recreation club, Sir Wallace Akers, I.C.I. research director, proposing the toast of "The Research Department of the General Chemical Division," drew attention to the fact that I.C.I., unlike a number of American companies, did not have a centralised research laboratory. Instead, there were 11 divisional research departments.

A good way to compute I.C.I.'s strength, he said, was to count the number of qualified scientists it employed in its research laboratories—1250. Of this number, the General Chemical Division, at Widnes, had about 165 in this category. The division's laboratory was a large research establishment by any system of comparison.

Millions for Research

I.C.I. spent £3 million a year on research, £400,000 of it in the Widnes laboratories. During the war, the company did work valued at £65 million for the Government research establishments. The largest part of this was done in the General Chemical Division at Widnes. "The uranium metal for the atomic pile at Harwell was made by this division," he revealed.

About 15 per cent of the £3 million spent annually for research was devoted to making minor improvements in processes and equipment. Another 15 per cent was spent on radical improvements, and another 15 per cent on what might be termed background research. The remaining 55 per cent was spent on new research and new research plant.

Seventy-five per cent of I.C.I.'s research expenditure was for work of a speculative nature. That showed the spirit of adventure, which the recently published Economic Survey had recognised to be very necessary in industry. It involved an element of gambling, and, if the Government ever nationalised the chemical industry, it must either go on gambling or stop altogether. The essence of speculative research was that one was never sure whether any of it would come off. It was, in fact, very lucky if even 10 per cent of it came off.

As a taxpayer, Sir Wallace Akers said he would not be at all pleased at the prospect of having the gambling done for him by the Government.

I.C.I. and Chemical Employers

"Companionate Members"

DISTINGUISHED members of the chemical and allied industries were among the guests at the annual dinner and dance of the Association of Chemical and Allied Employers in London, last week.

The president, Mr. A. E. Peak, proposing the toast of the guests, referred briefly to the association's achievements and recalled that in all the years he had been connected with the association there had been no major strikes or acrimony, while general improvement in benefits and conditions had been brought about.

Sir Frederick Bain, deputy chairman of I.C.I., Ltd., and president of the Federation of British Industries, replying to the toast, recalled his pleasant co-operation with Mr. Kenneth Wilson, former chairman of the association, during the war. He went on to observe that who ever represented I.C.I. at future gatherings of the association would not be there as a guest.

This was the first public reference to the fact that I.C.I. has now joined the association as companionate members.

Other speakers in the course of the evening were Sir Harry Jephcott, chairman, the Association of British Chemical Manufacturers; Sir Charles Renold, J.P., chairman of the British Institute of Management, and Dr. W. H. Garrett, who presided.

Determining Melting Points

New American Apparatus

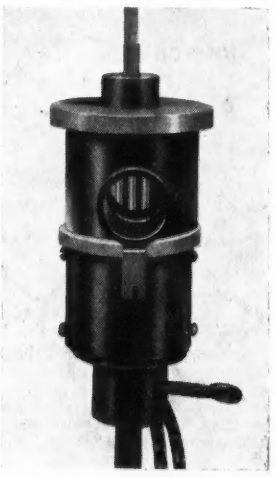
A NEW apparatus for the determination of melting points of chemicals, waxes, fats, etc., known as the Vanderkamp Melt-Pointer has just been described in the U.S.A.

The device consists of three parts: body, chamber block and adapter.

The upper section or block is machined of solid copper, and three well-spaced holes round the melting point chamber of this block fit over three 110 volt 50 watt cartridge-type heaters projecting from the base. Uniform heating controlled by a variable transformer, is thus achieved in the block and chamber. A thermometer and three capillaries are held in position in the centre of the chamber by an adapter plug.

In addition to the cartridge heaters, the lower portion or body of the apparatus houses a small 110 volt light bulb below a window for the illumination of the interior chamber. An opening in the body, shielded by a glass sleeve, permits observation of the capillaries through a magnifying lens.

The Melt-Pointer has a temperature range to over 400° C., and units with higher ranges can be made. No liquids or mechanical stirring units are required. Rapid continuous tests can be made, as the copper block can be removed and quickly cooled. Much greater speed in making melting point tests over other methods is claimed.



The Melt-Pointer

(*The Scientific Glass Apparatus Co., Bloomfield, N. Jersey*)

C

Carbonisation & Gasification

Improved Conservation of Heat

THE results of research by Hydrocarbon Research, Inc., of New York, directed to reducing some conspicuous problems associated with the pyrolysis of solid carbon material are reflected in a current British Patent Application (No. 15198/1948). This pays renewed attention to the difficulties associated with the massive generation of heat and the complication of plant rendered necessary by the presence of volatile substances and the need for numerous heat-exchange steps, in all of which heat is wasted.

Heat Conserved

Among the principal aims of the present invention are efficient recovery of volatile constituents and economy of heat. The material is gasified by a novel method in which the heat is produced from the material itself, with heat exchange so arranged that practically all the heat is conserved and put to good use.

The volatile components—tar, oil and coal gas—are volatilised by carbonising with highly efficient heat transfer and are kept from physical contact with the original material.

The material in finely divided form, *i.e.*, fluidised coke, is dispersed in a gaseous medium, such as suitably recycled coal gas, and subjected to flash carbonisation, the necessary heat for which is supplied by oxidation of residual coke. The whole process is carried out in a single reactor in which the fluidised mass, in contact with reactant gas or gases, is gasified, with generation of heat.

The material is arranged in indirect heat exchange relation with fresh incoming supplies of carbonaceous material containing volatile components, so that heat generated by gasification of the carbonised (devolatilised) material is made available, without substantial loss to the fresh material for the distillation of volatile components from them. These are separately withdrawn to avoid mixing with the gaseous products.

The incoming finely powdered material is fed through a heat exchange device heated by coke being gasified, and the residual heated fresh solid material is discharged as coke into a separator, receiving heat also from the reacting zone (separator). The carbonised material or coke thus is discharged into the fluidised mass of coke already in the gasification zone of the reactor.

The gaseous reactant may be oxygen, or hydrogen, with some admixture of steam or carbon dioxide. Suitable apparatus is described and included in the claims.

Progress in Medicinal and Fine Chemicals—VI

Penicillin Compounds : Classified Groups

by G. COLMAN GREEN, B.Sc., F.R.I.C., A.M.I.Chem.E.

THE difficulties in crystallising the alkali and alkaline earth salts of penicillin in a pure form are pointed out by Brown *et al.* (*J. Biol. Chem.*, 1948, *176*, 1977). The main difficulty is the high solubility of such salts and their tendency to crystallise from organic solvents containing minute quantities of water contaminated with coloured and odoriferous materials.

They describe the crystallisation of ammonium salt with very little colour which may, in turn, be converted to other pure salts. A soluble ammonium salt (such as ammonium sulphate) is added to a moderately concentrated solution (200,000 units per ml.) of penicillin (1000 units per mg. or better) when most of the ammonium penicillin crystallises, contaminated with ammonium salt.

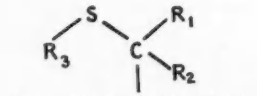
The penicillin is removed from the dried precipitate by dioxane containing 10 per cent water, leaving the ammonium salt behind. The addition of dioxane to the aqueous dioxane solution of penicillin precipitates the pure ammonium penicillin.

The antibacterial activity of some synthetic compounds related to penicillin has been examined by Brownlee and Woodbine (*Br. J. Pharmacol. and Chemotherap.*, 1948, *5*(4), 305).

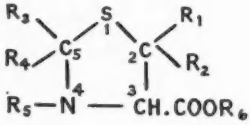
All these compounds were postulated, or were derivatives of compounds postulated, in the penicillin molecule. The compounds examined were conveniently classified into groups as follows:—

1. Penicillamines (I).
2. Thiazolidine-4-carboxylic acids (II).
3. Oxazolones (III).
4. Glycine derivatives (IV).
5. A miscellaneous group.

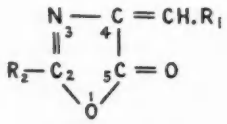
The relationship of the groupings with penicillin can be readily seen from the following structural formulæ.



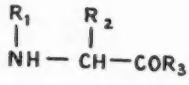
PENICILLAMINES (I)



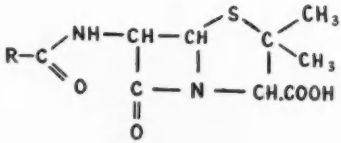
THIAZOLIDINE-4-CARBOXYLIC ACIDS (II)



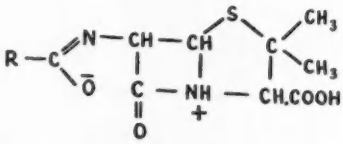
OXAZOLONES (III)



GLYCINES (IV)



PENICILLIN
β-LACTAM STRUCTURE
or
INCIPIENT AZLACTONE STRUCTURE



A number of these compounds were found to have antibacterial activity, but none possessed it in the degree shown by penicillin. Penicillamine esters had an antibacterial activity *in vitro*, but they were inactive in the presence of blood and serum.

It was demonstrated that the *in vitro* activity was not of the same type as in the case of penicillin.

The more active of these compounds were, moreover, found to be acutely toxic to mice when administered parenterally and, generally, it was felt that none of those compounds which were examined had any chemotherapeutic value.

Pratt and Dufrenoy (*J. Bact.*, 1948, *12* (1), 79) have speculated as to the mechanism of penicillin action on susceptible micro-organisms in the light of their own work and that of other workers in the field. The authors catalogue the following pertinent facts :—

(1) The micro-organisms most susceptible to penicillin action are those which are metabolising actively (*i.e.*, most rapidly absorbing O_2 and eliminating CO_2).

(2) At a given penicillin concentration sensitivity increases as oxygen becomes increasingly available.

(3) Sub-bacteriostatic concentrations of penicillin appear to increase oxygen demand.

(4) At bacteriostatic concentrations of penicillin oxygen uptake and carbon dioxide release are inhibited.

(5) An irreversible dehydrogenation of aldehyde and of thiol groups results.

Basis of Attack

From these facts the authors conclude the penicillin enhances dehydrogenation so that ability to survive depends upon resilience of reversible dehydrogenation and hydrogenation systems. An organism is, therefore, sensitive to penicillin when the latter stimulates dehydrogenation of functional thiol groups faster than they can be restored. The penicillin sensitive cell is thus induced into the lethal dehydrogenation of its essential reserves.

Current prices for penicillin in its various preparations in this country are now readily accessible in the technical Press and from manufacturers. Less readily accessible are American prices, which run at 10-11 cents per 100,000 units in bulk lots of amorphous calcium penicillin. On a similar basis, sodium penicillin is selling for 12.5 cents. By comparison, crystalline penicillin G is selling at 24 cents per 100,000 units.

A feature of the American market is the increasing demand for crystalline procaine penicillin selling at 13 cents per 100,000 units for bulk quantity. (*Drug and Cos. Ind.*, 1948, *63*, 2).

A penicillin producing plant has been brought into operation in Sweden during the past year with a capacity of 300 to 400 billion (American) units and employing 40 persons. It appears that Spain, which at present spends valuable dollars on importing 3 million 100,000 unit packs per annum (which satisfies only about 30 per cent of her requirement), is contemplating manufacture.

An additional penicillin plant is being erected at Höchst in Germany under the guidance of the American firm of Merck & Co. This will have a capacity of 100 billion (American) units per month.

In America the production of penicillin continues to expand and in July, 1948, is said to have reached a figure of 9486 billion (American) units. The actual figures for British production are not readily ascertained.

Statutory Definitions

In Britain, the Therapeutic Substances Act, 1945, has been amended in a number of respects and penicillin is implicated in some of the minor changes. (Therapeutic Substances Amendment Regulations, 1948. S.I., 1948, No. 2418.)

The main change is one of definition of the term penicillin. Formerly there was a difference between the definition in the official British documents and international documents. The British documents, Therapeutic Substances Act Amendment Regulations, 1946, Draft Rules and Orders, 1946, and the S.R.O., 1946, No. 731, gave the definition of penicillin as " any anti-infection acid produced by *Penicillium notatum* whether obtained by *Penicillium notatum* or not, any salt or derivatives of any such."

In Treaty Series No. 4 (1946), Cmd. 6757, which refers to the agreement between H.M. and U.S. Governments on exchange of information relating to the synthesis of penicillin, the definition runs, " Penicillin shall be deemed to mean any sulphur containing antimicrobic compound, characterised by degradation to penicillamine, which may be obtained as the result of the growth of some strain of *Penicillium notatum*."

Two Criteria

In the light of increasing knowledge the definition may be made more precise. " Penicillin " now means " any anti-microbial acid which :—

(a) " may be shown on chemical or physical examination to contain in its structure a fused thiazolidine β-lactam nucleus; or

(b) " loses its anti-microbial activity on hydrolysis by the penicillinases which destroy the anti-microbial activity of the substance known as " International Standard Penicillin " and accordingly, may, without chemical or physical examination, be presumed to contain in its structure such a nucleus as aforesaid."

This definition consequently offers two criteria of identity, one of which is physico-chemical and the other biochemical.

Adler and Wintersteiner (*J. Biol. Chem.*, 1948, *176* 873) have re-investigated flavicidin which is an antibiotic produced by *Aspergillus flavus*. Flavacidin has also been isolated and described as a separate antibiotic under the names of flavicin, flavatin, aspergillin, gigantic acid and parasiticin. These are now known to be various names for a single entity and, what is more and very interesting, a penicillin which is *not* produced by *Penicillium notatum*. (This fact would vitiate one of the earlier definitions of "penicillin" mentioned above.)

Identifying Flavicidin

In 1944, Fried, Koerber and Wintersteiner came to the conclusion (*J. Biol. Chem.*, 1946, *163*, 341) that flavicidin was 3-pentenyl-penicillin mixed with some benzyl-penicillin. It is now concluded from a study of a large-scale batch (*J. Biol. Chem.*, 1948, *176*, 873) that, whereas flavicidin was thought, formerly, to have been 3-pentenyl-penicillin, it was, in fact, *n*-amyl-penicillin.

The re-investigations in question have clearly demonstrated that under suitable conditions *Aspergillus flavus* equals *penicillium notatum* in its capacity to elaborate various penicillin species simultaneously. While benzyl-penicillin predominates, *n*-amyl-penicillin is concurrently produced by the Aspergillus. There was evidence of the formation of a small quantity of 2-pentenyl-penicillin at the same time.

(To be continued)

PENICILLIN IN EASTERN EUROPE

THE United Nations Health Organisation, at its recent Geneva meeting, decided to assist East European countries to obtain penicillin manufacturing equipment in spite of the U.S. decision not to export it to those countries. Inquiries have been addressed to Western European countries whether the production of the Podbielniak extractors, in which the U.S.A. is the specialist, could be developed and Italy has already expressed its interest. This extractor is essential to the large-scale manufacture of penicillin.

The Health Organisation considers that an increased penicillin output in Eastern Europe is essential to combat venereal diseases and improve general health standards. It is reported that the U.S.A. authorities have declined to comment on the ground that it was a "security matter."

Photography and Science

Kodak Laboratories' Coming-of-Age

THIS year marks the 21st birthday of the Kodak research laboratories in the organisation's factory at Harrow, Middlesex, and the occasion was celebrated yesterday (March 25) by a conversazione at which guests were shown the activities of the establishment. The celebrations are being continued to-day.

Photography is now used extensively in science, medicine and industry, as well as in the more familiar fields, and Kodak scientists are constantly seeking new opportunities to enlarge the field.

One of the latest applications is the direct recording of nuclear particles passing through photographic emulsion layers of especially high sensitivity, a method which bids fair to displace many other ways of detecting and recording nuclear events. In any of these happenings, from the explosion of the atom bomb to the carefully controlled laboratory experiment, individual atoms or fragments of atoms are shot off which, on passing through the special plates, leave behind a photographic image. This is developed and inspected microscopically, often yielding entirely new data.

PHOTOGRAPHIC CHEMICALS

DETAILS of two developing agents, Atomal and ethylhydroxy-ethylaminoaniline, manufactured in Germany but not made in this country, are given in British Intelligence Objective Sub-Committee Overall Report No. 19 (HMSO, 6d.).

Atomal was used as fine-grain developer and it was claimed to be free from toxity and superior to *para*phenylenediamine. It was manufactured by passing ethylene oxide into slurry of *o*-aminophenol, and sold as a packed fine-grain developer compounded with hydroquinine and pyrocatechin.

Ethylhydroxy-ethylaminoaniline was made primarily by the action of the ethylene oxide on ethylaniline. It was introduced as a colour developer to replace the alkyl-substituted *para*phenylenediamine, and was claimed to be free from any tendency to cause dermatitis.

British Agar.—Further indication of progress in developing a British seaweed derivatives industry was contained in an announcement last week by Fine Industrial Commodities, Ltd., Chase Estate, London, N.W.10. The firm has been processing indigenous seaweed to produce a high-grade agar and is now in process of doubling its productive capacity.

SOLVENTS, DUSTS AND MACHINERY

Safe Handling of Three Factory Dangers

THE danger inherent in the handling, storage and processing of solvents and dust-producing materials was the subject of a far ranging survey before the London section of the Oil and Colour Chemists' Association last week by Mr. A. Webster, safety officer of the Association of British Chemical Manufacturers. This talk, representing personal opinions, rather than the policy of the ABCM, served also as a very useful "digest" of some aspects of the discussions of safety procedure which took place last year.

Considering common causes of fire damage by solvents, Mr. Webster gave it as his view that solvents should be stored in tanks completely or partially below ground. He did not like overhead storage tanks, notwithstanding the advantage that gravity flow could be used and pumping costs were saved. Gravity flow should be used only for small-guage tanks and not for large storage tanks.

Where gravity flow was used from a large tank, the whole of the pressure was usually held by one relatively small valve, and if it were not in good condition, leakage was bound to occur. If a gauge tank were used as a feed to process equipment, the tank would be filled, as required, by pumping, and the overflow returned to the tank; as soon as the pumping stopped, the liquid in the pipe would drain back into the storage tank, where it should be.

He suggested that a plug should be provided for insertion in the outlet from a tank so that, should the outlet valve spring a leak, the flow of the liquid could be stopped so that the valve could be repaired. Such a device would save draining the tank.

Bulk Storage

Discussing the reduction of fire risk where solvents were stored in bulk, he said the obvious first requirement was a saucer round the tanks, sufficient to contain the contents of all of them; under the Petroleum Consolidation Act, any drain from such a saucer should be fitted with an intercepter so that dangerous substances would not go into the local sewers.

The most appropriate means for fire-fighting in such a case was probably a fixed one, preferably foam. It might be advisable to arrange for the free space in the tanks to be filled with carbon dioxide, and that might prevent the formation of a skin on stored paint.

He liked the method recommended by the Factory Department for the storage of carbon disulphide, in which the surface of the solvent was sealed with water. That, supported by a patent, he believed by Bywaters, would most likely overcome the difficulty of the storage of solvents lighter than water. The patent arranged in effect for the supply of water to be governed by a float valve so that, as solvent was drawn off, the water level was automatically maintained. It could be recommended only for liquids absolutely immiscible with water.

Dust Explosion

Information about the explosive limits of dusts was a little scanty. Classification under the system devised by Wheeler and given in the Memorandum on Dust Explosions in Factories could depend very largely on the conditions of the sample, with respect to moisture content and particle size. It did, however, give a definite indication as to whether or not a dust was inflammable.

Generally the lower explosive limit for dusts in the atmosphere was 0.02 oz. per cu. ft. There were practically no organic or inorganic dusts for which the upper explosive limit was known; indeed, it was doubtful whether there was an upper explosive limit.

The design of an explosion relief required thought. Theoretically, all that need be known was the amount of dust which was likely to burn, and its rate of burning. From its composition it should be possible to calculate the pressure developed within the container and, therefore, the thickness of walls which would resist that pressure. Having calculated the pressure in the container, it was necessary to arrange for its release.

An explosion relief should be designed to permit it to burst at a reasonably safe pressure below the limits of the container. Any explosion relief should be vented to the open air in such a manner as would prevent damage to an adjacent plant.

It was stated in certain published work that in a long ducting there should be an explosion vent at about every 15 ft. It should be borne in mind, however, that it was possible that the explosion would be vented into a dusty atmosphere, which might produce a secondary explosion, more violent than the primary.

Again, at changes of direction in ducting there was a build-up of pressure, and probably they were the best places at which to provide explosion reliefs. Not all dusts

(*Continued at foot of next page*)

Developing Hungarian State Chemicals

Progress with Therapeutical Materials Claimed

IN the past decade, the Hungarian pharmaceutical industry has not been able to compete on the world market. At the end of the war, a serious lack of raw materials, previously imported from Germany, impeded development of the industry. An optimistic view of the scale of current achievements and of prospects of chemical industry and research under State control is presented in a Press statement supplied by the Hungarian News and Information Service in London.

Since the nationalisation of the large pharmaceutical factories—it is claimed—scientific work has been organised collectively and a free exchange of ideas and of production problems between the different factories has operated.

Each medicine is produced by the factory most suitable by reasons of its staff, machinery, raw materials and other amenities, irrespective of whether the same factory carried out the original work.

There is an organo-therapeutic factory—says the Press statement—and a laboratory for the preparation of antibiotics and another for the manufacture of analytically pure chemicals. The organo-therapeutic factory has a collection of 15,000 animals and is one of the best equipped of its kind.

To-day, the position is such that well-known Hungarian pharmaceutical products, like utraceptyl and vitamin preparations are produced in sufficient quantities, to satisfy the home market and also to export. The Hungarian pharmaceutical factory—Chinoin—produces one-third of the world's supply of papaverin from which morphium is prepared.

Large-scale experiments are in progress in the Pharmaceutical Institute and in the research laboratories in order to cultivate penicillin moulds. These experiments are progressing very satisfactorily and Hungarian penicillin will soon be available.

A new synthetic sedative called Hexalgon, will soon appear, and it is expected that Dicaptol—a sulphur preparation—will find wide use against metal poisoning. The synthesis of vitamin B_1 is also being sought.

Paludrine and cyclopropane, a new sleeping draught, are among medicines being produced for the first time in Hungary.

Streptomycin cannot yet be produced, but the Chinoin factory said to be manufacturing a useful medicine in the fight against tuberculosis, namely a paraminosalicylic acid, which can be administered either in the form of tablets or injections, and seems to be a suitable substitute of streptomycin, in certain cases of tuberculosis.

The pharmaceutical industry is receiving help from the Hungarian State; £20,000 is allocated for planned research. Home-grown herbaceous material, by-products of the oil, tar and other industries, will supply the pharmaceutical industry with at least part of its raw materials.

SOLVENTS, DUSTS AND MACHINERY

(Continued from previous page)

of organic origin could cause explosions if finely ground and dried, but it was safe to assume that they might.

Considering the possibilities of physical injury, or gassing associated with the use and servicing of plant, the speaker directed attention to the more important provisions of the Chemical Works Regulations, which he recommended should be made very definite and concise regulations in individual plants.

He pointed to several other desirable conditions which would usefully supplement what was officially required. When erecting tanks, manholes larger than the minimum requirement should be fitted if possible. It was extremely difficult to get an unconscious man out of a tank by means of a rope and harness, and a small tripod with a pulley plug giving a mechanical advantage of 5/1 or 6/1, which could be rigged over a manhole while the man was in the tank, would help considerably to get him out.

Roller mills in the paint industry, he believed, were fairly well guarded; the main possibility of accidents was during cleaning. He personally would insist on any roller mill being so arranged that any rotation needed during cleaning was done by hand; he would have special spanners made where two men were working on a mill, so that only one of them could rotate the mill. Mixing and kneading machines had in the past caused accidents, generally during emptying, for the blades usually had to be rotated slightly to remove the mix; there again, hand inching he believed to be the only solution. There seemed no reason why, during normal running, a lid could not be fitted, with an inter-locking device. It might be possible, in a motor-driven machine, to provide some rapid automatic stop device.

MORE REFINERY GAS

Source of Increasing Aid to Fuel Industry

A FURTHER step in the closer integration of British petroleum refining with the general economic and industrial activity of the country was taken last week when a pipe line was opened from the Ellesmere Port (Cheshire) gas works to the nearby petroleum refinery of Lobitos Oilfields, Ltd.

This line, nearly two miles in length, serves to feed to the gas works the surplus gas formed during cracking operations at the petroleum refinery. The cracking plant concerned is a Dubbs thermal cracking unit of a standard pattern which has been operating for some years and is engaged in the production of motor spirit from normal feed stocks. In the process are normally produced gases which consist mainly of low molecular weight hydrocarbons having up to 3 carbon atoms per molecule. It is standard practice at the refinery to use these gases as fuel both for firing the cracking unit itself and for steam raising purposes, but there has always been a small surplus which it has not been practicable to utilise in this manner.

By linking up the refinery with the local gas undertaking such surplus gas can be put to good use in enabling the gas works to economise in coal and to meet peak load demands more readily.

The amount of gas that it is expected to transfer is about 25,000 cu. ft. per day, which, owing to the greater calorific value of petroleum gases as compared to coal gas, is equivalent to about three volumes of the latter.

This supplement will enable the gas undertaking to economise to the extent of about 2000 tons of coal annually.

With the great expansion of the petroleum refining industry which will occur in Britain within the next few years, the assistance which petroleum refineries will be able to give, in this manner, to the gas industry will assume important proportions.

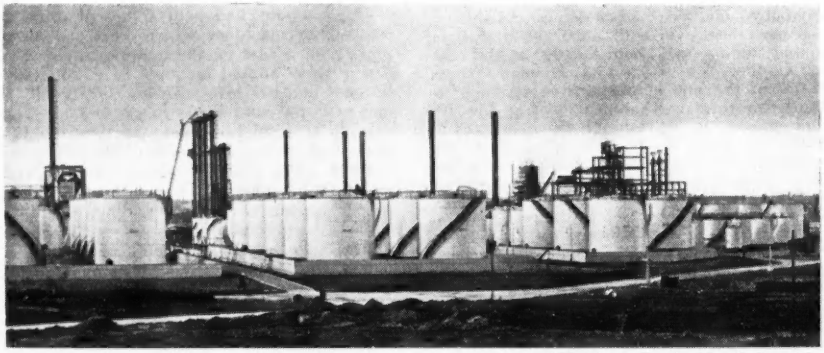
The Lobitos development is the second supplementary supply from the oil industry added to the Manchester resources in recent weeks. The gas department is already receiving from the petroleum-chemicals works of Petrochemicals, Ltd., at Partington, some 140,000 cu. ft. of oil gas daily (THE CHEMICAL AGE, *60*, 239).

Film of a Fractionating Tower

The construction and transport of a 100 ft. fractionating tower forms the subject on an unusual industrial information film, "A Tall Order," which has been shown on London.

The tower was made by G. A. Harvey & Co. (London) to the order of the Lummus Company of New York on behalf of the Shell Refining and Marketing Co.

The film shows a number of scenes in the works of the makers at Greenwich, and the great structure winding its way through the heart of London (THE CHEMICAL AGE, *58*, 515).



"Manchester Evening News" Copyright

Typifying the growing assembly of new oil installations at Ellesmere Port, which are yielding an increasing flow of refinery products, for chemicals as well as fuel and power industries : part of the "Shell" refinery at nearby Stanlow

DEPRECIATION & MAINTENANCE—VIII

Different Methods as Applied to Specific Assets

By S. HOWARD WITHEY, F.Comm.A.

APART altogether from the accounting aspect, the chemical engineer or manufacturer should regard depreciation of assets as a lessening in value from *any* cause, and should remember that during periods of rising values depreciation may be converted into appreciation. Nevertheless, all items of capital expenditure should be spread over the service or useful life, and the annual charges under this heading are as much a charge against the operations as are any other items of expenditure, providing the depreciation has arisen through use in the business.

Assets

As a rule, the assets of a business include freehold buildings, plant and machinery, tools and equipment, transport vehicles, goodwill, freehold land, leaseholds, patents, etc., and there may be assets of a wasting nature which are consumed in the form of basic raw material, and the methods adopted for computing depreciation are not likely to be the same in every case.

If any units of machinery have been acquired on the hire-purchase system, the calculation of the amount to be written off each year and the compilation of the vendor's account may be very complicated, and the following examples of a recent case are worthy of examination as indicative of the best methods to be applied in a given set of circumstances.

At December 31, 1948, the assets of a company included plant and machinery having a book value of £100,000, and estimated to be worth about £22,000 at the end of another ten years and no more than £5000 at the end of twenty years; machine tools shown on the balance sheet at £10,000 and possessing a residual value of about £6000 ten years hence; and loose tools and equipment of short effective life (including jigs and patterns) and having a book value of £356.

Premises

The freehold business premises were shown at £20,000, which was an excessive figure that had not been subjected to any deduction over a number of years, and the company owned a considerable acreage of freehold land which was not being used for business purposes and which appeared on the balance sheet at £15,000, although its actual value was more like £5000.

A few weeks before the balancing date the company had taken over certain premises on a 7-years' lease at a cost of £850, the agreement specifying that in the event of renewal the price would be increased by 50 per cent, and to meet this arrangements had been made to take up an investment for the purpose of securing the sum of £1275 for the renewal of the lease in November, 1955. The company's transport comprised electric vehicles having a book value of £5000 and estimated to be worth £2500 at the end of five years, and certain patents having six years to run were valued at £3780.

After a good deal of procrastination it was decided to apply the straight line method of computation to the freehold buildings, the transport and the patents; the percentage method to the plant and machinery; the sinking fund method to the lease; and to subject the loose tools and equipment to a revaluation on the part of a chemical trade expert.

Land

As the land was not a business asset it was agreed to write off £10,000 and to show this as a separate item on the debit side of the next profit and loss account, and the goodwill which was shown in the books at £15,000 was to be reduced to £10,000 and extinguished at the end of another two years.

The company had paid a deposit of £120 on certain machines which were delivered in December last on the understanding that five further annual amounts of £120 would be paid under a hire-purchase agreement or one cash payment made in settlement. The deposit of £120 had been posted from the cash book to the debit side of the machines account opened in the private ledger, and as the full value of the machines was not shown in the books it was impossible to claim a depreciation allowance. Owing to difficulty in assessing their present value it was decided to pay the five annual instalments and to write off 20 per cent each year for wear and tear, calculated on the reduced book value.

The various accounts giving effect to the facts and circumstances referred to will be made up in the manner indicated at the top of the next page.

PLANT AND MACHINERY

Debit		£	Credit		£
1948			1949		
Dec. 31	To Balance ...	100,000	Dec. 31	By 13.911 per cent Depreciation written off ...	13,911
			,, 31	By Balance ...	86,089
		£100,000			£100,000
1949			1950		
Dec. 31	To Balance ...	86,089	Dec. 31	By 13.911 per cent Depreciation written off ...	11,976
			,, 31	By Balance ...	74,113
		£86,089			£86,089
1950			1951		
Dec. 31	To Balance ...	74,113	Dec. 31	By 13.911 per cent Depreciation written off ...	10,310
			,, 31	By Balance ...	63,803
		£74,113			£74,113
1951			1952		
Dec. 31	To Balance ...	63,803	Dec. 31	By 13.911 per cent Depreciation written off ...	8,876
			,, 31	By Balance ...	54,927
		£63,803			£63,803

and thereafter by equivalent stages to :—

1967			1968		
Dec. 31	To Balance ...	5,808	Dec. 31	By 13.911 per cent Depreciation written off ...	808
			,, 31	By Balance ...	5,000
		£5,808			£5,808
1968					
Dec. 31	To Balance ...	£5,000			

It will be seen that the book value of the plant and machinery will be £22.360 at the end of 10 years and exactly £5000 at the end of another 10 years. The machine tools account will show the following entries :—

MACHINE TOOLS

Debit		£	Credit		£
1948			1949		
Dec. 31	To Balance ...	10,000	Dec. 31	By 5 per cent Depreciation written off ...	500
			,, 31	By Balance ...	9,500
		£10,000			£10,000
1949			1950		
Dec. 31	To Balance ...	9,500	Dec. 31	By 5 per cent Depreciation written off ...	475
			,, 31	By Balance ...	9,025
		£9,500			£9,500
1950					
Dec. 31	To Balance ...	9,025			

and equivalent annual adjustments to :—

1957			1958		
Dec. 31	To Balance ...	6,303	Dec. 31	By 5 per cent Depreciation written off ...	315
			,, 31	By Balance ...	5,988
		£6,303			£6,303
1958					
Dec. 31	To Balance ...	£5,988			

The loose tools and equipment having a book value of £356 were valued independently at £275, and the account in the company's ledger was adjusted thus :—

LOOSE TOOLS AND EQUIPMENT

Debit		£	Credit		£
1948			1949		
Dec. 31	To Balance ...	356	Jan. 18	By Revaluation as at this date, carried down ...	275
			,, 18	By Transfer to Depreciation ...	81
		£356			£356
1949					
Jan. 18	To Balance ...	£275			

It was anticipated that the business premises would be sold for £18,000 in 1952, and accordingly the balance of the account is being depreciated at the rate of 2½ per cent per annum or four deductions each of £500.

The amount written off the book value of the freehold land will not be debited to depreciation account but will be treated as an appropriation of the current year's profit, and when the final accounts are prepared as at the end of December next the asset account will show the following figures :—

FREEHOLD LAND

Debit			Credit			
1948		£	1949		£
Dec. 31	To Balance	15,000	Dec. 31	By Amount Written Off, Transferred to Profit and Loss Account	10,000
			,, 31	By Balance	5,000
		£15,000			£15,000
1949					
Dec. 31	To Balance	£5,000			

In regard to the renewal of the lease, arrangements were made for the investment of £157 each year over a period of seven years, these annual premiums to be posted direct from the company's cash book to the debit side of an investment account. Originally it had been the intention to spread the cost of the lease over the period by writing off £120 each year, but in view of the fact that the agreement specified that the renewal price would be increased to £1275 the amount of each annual premium will be debited to profit and loss each year and credited to a sinking fund.

As the investment of £157 each year is to be made on the basis of 5 per cent compound interest, only two-thirds will have a direct connection with the existing lease, because in order to renew on the previous terms the annual premium would have been £105 and the total interest £115. In this connection the following table gives the annual instalments of £1 required to produce £1 over periods ranging from four to ten years, with interest accumulating at different rates :—

Years	3 per cent	4 per cent	5 per cent
4	0.239027	0.235490	0.232012
5	0.188355	0.184627	0.180975
6	0.154598	0.150762	0.147017
7	0.130506	0.126610	0.122820
8	0.112456	0.108528	0.104722
9	0.098434	0.094493	0.090690
10	0.087231	0.083291	0.079505

(*To be continued*)

Tax Relief Plea for French Chemical Industry

IMPORTANT activity and progress in agricultural chemistry was reviewed at the meeting recently organised in Paris by the Société de Chimie Industrielle. Mons. Poutiers, of the Ministry of Agriculture, giving a short resumé of progress accomplished in 30 years, recalled that in 1920 the only general chemical intervention was lime and various emulsions which the producer prepared very inefficiently himself. To-day, the agricultural pharmacopæia was immeasurably extended.

In the present accelerated scientific progress, the use of vegetable hormones was being fully evolved. It was possible that oxychlorides would supplant copper sulphate, which is scarce owing to lack of foreign currency, and that diseases due to deficiencies would be eliminated.

Two essential problems for agriculture, said Monsieur Ghabrolin, of the Société Progil, were to intensify the study of growth regulators and to develop out of the experimental domain products which would reliably inhibit the premature falling of fruit. A plea for adjustment of prices of treatment for trees to correspond with the value of harvests was made by Prof. Chouard.

It was suggested that, in recognition of the economic benefits of scientific research, it would be opportune if taxation relief were given to chemical industry, so that profits could be used for maintenance and extension of private laboratories.

Steel Economy Committee

The Institute of Welding, the Iron and Steel Institute and the British Iron and Steel Federation are among the eight professional organisations which have agreed to co-operate as a committee with the Ministry of Works to effect savings in steel usage, which, despite the record output recently achieved, still tends to be much higher than resources permit. Among the committee's objectives will be "to organise, through professional institutions, technical papers and discussions on steel economy, with a view to exercising the economies to be derived from high performance specifications and more scientific methods of design; and to arrange publicity to give effect to these measures." Dr. David Anderson will be chairman of the committee.

American Chemical Notebook

From Our New York Correspondent

UNDERWATER combustion long ago established its usefulness in certain specialised activities, such as flame cutting on wrecked ships. The adaptation of the idea to reclaiming citrus wastes is, however, new. Advantages of this system were explained by E. M. Burdick, of Texsun Citrus Exchange, with C. O. Anderson and W. E. Duncan, of Ozark-Mahoning Co., in their address to a recent regional meeting of the American Institute of Chemical Engineers in Los Angeles. Submerged combustion avoids sticking and scorching, allows the use of smaller and cheaper equipment, and, furthermore, it pasteurises the syrup and precipitates certain materials that would interfere with later processing.

* * *

What is claimed to be the world's largest and most modern resin plant, with an annual capacity of 100 million pounds of resin, was recently put into operation by the United States Industrial Chemicals Company, Inc., at Newark, New Jersey. The new plant will manufacture alkyds, maleic resins, pure and modified phenolic resins and ester gums, as well as specialities. The 33 tanks range in capacity from 15,000 to 50,000 gal., with a combined capacity of 700,000 gal. Each of the stainless steel processing reactors for the resin manufacture in the new plant are capable of producing batches of 6000 gal. of resin solution at one time.

* * *

The team of 16 British steelfounders which arrived in New York last week made good use of its first few days here, visiting the Copper Alloy Foundry Company, largest stainless steel casting factory in the U.S.A., at Hillside, New Jersey. They will visit more than a dozen industrial cities in their six-week stay and, in the words of the field director of the ECA technical assistance organisation, " We are arranging for these visitors to get the utmost good out of their visit, studying modern production methods in some of the best equipped and most efficiently operated foundries in this country. We expect also that we shall gain from their visit many valuable suggestions which can be used in our own steel factories." ECA is financing the inspection tour within the U.S.A. and from the U.K. ECA joint fund each of the delegates will receive $12 a day special living expenses.

Submerged burners have been applied in treating a variety of sodium and potassium salt solutions and slurries in the potash industry, concentrating magnesium chloride solutions and phosphoric acid solutions. Still other uses are in re-carbonating, and in heating high-boiling point or high-melting-point. Citrus waste used to be treated as a fertiliser, or the pulp was fed directly to cattle. Submerged combustion now enables the recovery of the liquid components, which contain valuable sugars. Experience at the Texsun plant had proved highly favourable.

* * *

The first commercial production of nylon plastic in colours was announced last week by the E.I. du Pont Nemours Co., which states that moulding powders of the plastic are now available in a range of 13 colours consisting of buff, grey, light green, dark green, two light blues, peach, red, pink, orange, yellow, ivory and white. Colours were developed which could be incorporated directly into the material and would withstand the high temperatures at which nylon is moulded. The coloured forms of nylon are said to have all properties of the plastic in its natural colour, including heat resistance that permits sterilisation of nylon products by steam. In industrial applications, colours are expected to be valuable for identification purposes.

* * *

With both the Allegheny-Ludlum Steel Corporation, Pittsburgh, Pa., and the Babcock & Wilcox Tube Company, Beaver Falls, Pa., about to enlarge their experiments with continuous casting of steel, commercial production utilising the new technique is expected to be started in the U.S.A. before the end of 1949. Allegheny-Ludlum is currently installing a Rossi (Junghans) reciprocating mould machine for continuous casting of stainless steel. The machine, similar to one used for continuous casting of brass, is expected to be completed in five weeks and to turn out billets measuring 3 in. by 15 in. in cross-section, said to be the largest ever attempted in steel. The Babcock and Wilcox Company, which has been testing a smaller casting mould, will soon start experiments with a larger mould, a higher tower and a six-ton furnace. Tests with smaller equipment have been successful.

The Royal Society

Chemists and Physicists Elected

SCIENTISTS associated with chemistry or the physico-chemical sciences comprise more than half of the long list of Fellows of the Royal Society elected at its meeting on March 17. In the following list the work for which each individual is particularly distinguished is shown in parentheses after the name :—

ALLEN, John Frank. Professor of Natural Philosophy, University of St. Andrews. (Low temperature physics, especially new phenomena shown by liquid helium.)

BAILEY, Richard William. Head of Mechanical and Metallurgical Research Department at Metro-Vickers, Manchester. (The behaviour of metals at high temperatures and advances in design of turbines.)

BAWDEN, Frederick Charles. Head of the Plant Pathology Department at Rothamsted Experimental Station, Harpenden. (Plant viruses, virus diseases, and virus serology.)

CHAIN, Ernst Boris. University Demonstrator in Chemical Pathology, Oxford University. (Enzymes of snake-venom and bacteria, and especially researches on penicillin and other antibiotics.)

EVANS, Ulick Richardson. Reader in Metallic Corrosion, Cambridge University. (Metallic corrosion.)

HUGHES, Edward David. Professor of Chemistry, University College, London. (Mechanism of the reactions of carbon compounds.)

LOCKSPEISER, Sir Ben. Chief Scientist, Ministry of Supply. (Development of modern aircraft.)

MARSTON, Hedley Ralph. Chief of Division of Biochemistry and General Nutrition, Commonwealth Council for Scientific and Industrial Research (University of Adelaide, South Australia). (Nutrition and wool growth in merino sheep, and trace element deficiency diseases in ruminants.)

MATHER, Kenneth. Professor of Genetics, University of Birmingham. (Genetics and particularly polygenic inheritance.)

MORGAN, Walter Thomas James. Research worker, Lister Institute of Preventive Medicine; Reader in Biochemistry in the University of London. (Chemistry of immunology and blood groups.)

PIRIE, Norman Wingate. Head of the Biochemical Department, Rothamsted Experimental Station, Harpenden. (Chemical and physical properties of plant viruses.

POWELL, Cecil Frank. Melville Wills Professor of Physics, University of Bristol. (Experimental physics, especially the properties of mesons.)

SCOTT, David Aylmer. Research member, Connaught Laboratories, University of Toronto. (Chemistry of insulin, heparin and carbonic anhydrase.)

SUTHERLAND, Gordon Brinis Black Mcivor. Reader in Spectroscopy, Department of Colloid Science, University of Cambridge. (Infra-red and Raman spectroscopy, especially of hydrocarbons.)

SUTTON, Oliver Graham. Professor of Mathematics and Physics, Military College of Science, Shrivenham. (Atmospheric turbulence and evaporation.)

THOMAS, Meirion. Professor of Botany at King's College, Newcastle-upon-Tyne. (Plant physiology and particularly the breakdown of sugar in the plant.)

YOUNG, Frank George. Professor of Biochemistry, University College, London. (Rôle of the hormones of the anterior lobe of the pituitary gland in carbohydrate metabolism.)

New French Laboratories.—A research centre is to be set up at Verneuil by Charbonnages de France for the study of fires and explosions in mines, and improved methods of coal extraction and washing. It is expected that the new building will be ready in 1951.

LETTER TO THE EDITOR

"Russian Literature Neglected"

SIR,—With reference to THE CHEMICAL AGE, March 12, 1949, I was very interested to see that you had thought fit to emphasise this. The subject is, of course, being consistently stressed in the American technical Press. I should like, however, to make the following comments :—

I have followed Russian metallurgical literature for a number of years, and we have really found nothing on the metallurgical side which has been of great help to industrial research and development laboratories.

At the moment, I am particularly interested in finding out what the Russians have done in the following spheres :—

(a) Use of oxygen in open hearth, Bessemer and blast furnaces (we are, of course, aware of Shapovalov's work on "Oxygen"), and in 1946 and 1947 we received the journal *Kislorod* (Oxygen) direct from The International Book Company in Moscow, which you mention on page 378. For some unknown reason, however, Moscow stopped sending this in December, 1947, and we have not been able to obtain it since.

(b) Ore Benification in General. I recently borrowed Pavlov's three volumes, in Russian, on the Metallurgy of Pig Iron. This is, of course, primarily a text book for Russian metallurgical students, but there was very little mention of new developments, such as direct reduction processes, briquetting, high top pressure in blast furnaces, use of oxygen, etc.

My company does buy translations of Russian metallurgical literature, an excellent service, covering such journals as *Stal* and *Zavodskaya Lab.*

I think that the difficulty of the script is often emphasised, and I know that it is possible to learn the within half-an-hour if one is anything of a linguist. The difficulty begins when one has learnt the script and when the mechanism of Russian must be studied. As you rightly say, due to the inflection, the "word order" is not so important, but I have found that the main difficulty is one of idiom especially if one has never spent any time in Russia and has relied on book study.

I have found sometimes that when the title, for instance, spectrography or X-ray photography indicated an interesting paper, the details given were inadequate. There is often a considerable amount of verbiage about the more obvious points, and a lack of explanation of points which one wants to know about.

Finally, I find it useful to borrow copies of Russian techuical journals from the Iron and Steel Institute, and occasionally from the S.C.R. It is, however, rather aggravating when one gets an article on, for example, the Dzerzhinski works and is looking to see what kind of furnaces they have, wishing to read something of the blast furnace lines, of the burden preparation and the rolling and forging installations, to find one has to wade through several introductory paragraphs, sometimes running into pages, in praise of the Soviet system, followed by comparative productions in percentages, not in concrete figures and no technical details of the plant and processes. Such articles compare very badly with articles on plants such as The United Steels, Steel Company of Wales, Corby, etc., which appear in our own Press.

I think, therefore, that it is not so much a question of "retiring behind the philological curtain" as, having overcome the language difficulty and gone behind the first curtain, being faced with a considerable thickness of cottonwool. I am at the moment waiting to hear whether I shall receive any reply to letters which I have written to Hungary to try to obtain published details of the new ore plant and blast furnaces at Ozd.

To sum up, whilst I think it is very important for Russian to be taught in this country, I am sceptical of its application in obtaining scientific data, at least in the metallurgical field, though the position in some of the chemical spheres might be different.

68, Milden Road,
Sheffield, 6.

Yours, etc.,
R. SEWELL.

A CHEMIST'S BOOKSHELF

Methods of Quantitative Micro-Analysis. Collected and edited by R.F. Milton and W. A. Waters. Pp. viii+599: Figs. 169. 1948. London: Edward Arnold & Co. 60s.

When, some twenty years ago, Emich's classical texts on microchemistry were made available, through Schneider's translation, to the English speaking world, the field had even then grown to such an extent that it was necessary for the author to turn to other authorities for help in certain branches. The applications of microchemistry have grown immeasurably since then, and it is hardly possible for a single author to attempt to give an authoritative account, based on adequate practical experience, under the title of this work. Yet an up-to-date survey which could be used as a working basis for practising any required technique has been badly needed for some years. The editors have wisely enlisted the help of a number of well-known microchemists, each an authority in one or more branches of the subject, and the present book is therefore the work of five who have, from time to time, pooled their information, and who are now making their experience available.

There are six main sections. Part I, dealing with gravimetric apparatus and general microchemical techniques, begins with a description of the microchemical balance and its use, and describes a selection of the fundamental gravimetric operations, such as precipitation, filtration and drying. A brief account is given of the more usual organic reagents used in inorganic gravimetric analysis, and the section ends with a table of micro-gravimetric methods. Part II, which is concerned with the microanalysis of organic compounds, discusses the determination of carbon and hydrogen, nitrogen, sulphur, halogens, oxygen and metals. The determination of molecular weights and of specific organic groups are also covered. Part III, volumetric methods, describes the appearance and use of a considerable range of volumetric apparatus, presents a representative selection of volumetric determinations, and concludes with a table of inorganic volumetric methods. Part IV is concerned with colorimetric analysis, and the allied techniques of nephelometry and fluorimetry. After an introduction to the apparatus and methods, a range of colorimetric procedures is described, supplemented by a table giving a selection of other determinations, both inorganic and organic. In Part V, electrochemical methods of microanalysis, an adequate introduction is given to conductometric and potentiometric titrations, polarography and amperometric titrations, and electro-deposition methods.

The gasometric methods of microanalysis describes methods devised for purely chemical purposes, by both constant-pressure and constant-volume apparatus, as well as the manometric methods used widely by physiologists and biochemists, which may on occasion be readily adapted to chemical uses.

The descriptions are clear, and, where the reviewer is familiar with them, adequate for carrying out the determinations described. The illustrations, specially drawn for the book, are very fine, and the production and lay-out are beyond criticism. Because of the increasing use of semi-micro methods using similar techniques, it would have been appropriate to bring such work more directly to the notice of the reader. In the organic quantitative section brief mention is made in passing of the fact that such techniques are possible, but it is not stressed that they are, indeed, in many cases to be preferred to either full-micro or macro methods unless the smallness of the sample precludes their use. It is inadvisable to place too narrow an interpretation on the elusive term "micro methods," since the techniques are often essentially the same, whether milligram or centigram samples are being handled, or to encourage, even by implication, the idea that milligram work is necessarily better. References are given throughout the text, but these are by no means exhaustive; an index of references arranged under authors would also have been a useful addition. Notwithstanding these criticisms, it is not doubted that the book is a valuable contribution to microchemical literature, and is likely, indeed, to become a standard work. It is a fitting addition to the rather small list of works in microchemistry which do not emanate either from Germany, by way of translation or revision, or from America.

Home News Items

Sperm Oil.—The full scale of the newly reduced official prices for sperm oil is as follows (per ton): Crude heads £60, blubber £60, carcase £58, No. 3 £57.

Factory Savings Scheme. — Monsanto Chemicals, Ltd., has more than 1000 members in its saving scheme at the factory at Cefn Mawr, in East Denbighshire. This represents nearly 70 per cent of all employees.

Whale Oil.—The second consignment of whale oil direct from the Antarctic has reached Liverpool in the tanker *Polarsol*, which, after discharging 2000 tons at Bromborough, will deliver 9000 tons to Norway. Three other tankers, each carrying about 12,000 tons, are due.

Business Expansion.—Reorganisation in nearly all departments has been undertaken by Laboratory Equipment (London), Ltd., with a view to considerable extension of activity in scientific apparatus and glassware. Premises are being extended, stock and transport increased and new office procedure to expedite the service is being adopted.

New Grass Research Station.—A new grassland research station of 500 acres is to be established at Hurley, Berkshire, by the Ministry of Agriculture and the Secretary of State for Scotland in co-operation with the Agricultural Research Council. The existing grassland improvement station at Drayton, Stratford-on-Avon, will be transferred and its staff form the nucleus of the new enterprise.

Reorganising Zinc Interests.—The foundation of an integrated zinc industry based on mining and exploratory operations in Australia and smelting operations in the U.K. and Commonwealth is the objective of the reformation of the Zinc Corporation as a new company with an authorised capital of £20 million, the Consolidated Zinc Corporation. Assuming full acceptance and with the public issue of further preference capital, the issued share capital will be £11,024,573.

Transport of Sheet Glass.—As a result of experiments begun in 1946 by the L.M.S. Railway and Pilkington Bros., Ltd., St. Helens, a new type of padded cradle carried in special shock-absorbing wagons has been devised. The cradles are removable and can be carried in both road and rail vehicles. A wagon can carry in safety two cradles with 8¾ tons of sheet glass, compared with a load of three to five tons when the glass was packed in crates.

Chemical Works to Close.—A 70-acre factory at Netham, near Bristol, belonging to I.C.I., Ltd., is to be closed in June. It is hoped that employment will be found for most of the 113 staff elsewhere.

Tin Allocations.—The Combined Tin Committee has made the following additional interim allocations of tin for the first half of 1949 (in long tons): Egypt 160, Israel 60, Turkey 125, total 345.

Liquorice Juice.—The Ministry of Food and the Board of Trade are to provide for a limited quantity of liquorice juice to be imported from Italy during 1949 under specific licence. Applications to import supplies from other countries will also be considered.

Ample Oxalic Acid.—Expansion of productive capacity of I.C.I., Ltd., is stated to be sufficient to end the scarcity of oxalic acid, which has persisted since the beginning of the war. I.C.I. states that it is now able to make prompt delivery in any part of the U.K. Board of Trade licences for oxalic acid will no longer be needed for home consumers.

Scented Rubber?—Tyres coloured to match cars and scented hot water bottles are two new ideas in the rubber industry, Mr. Edwin F. Mitchell, Midland manager of the Dunlop Rubber Company, told Long Eaton Rotary Club recently. White, red, silver and translucent cycle tyres were already being produced, he said, and if there was a popular demand that tyres should match the colour of motor cars, they could be provided. Good results had already been secured in the laboratories using organic dyestuffs largely based on coal tar. Ingredients with a pleasant smell were also now being added to mask the natural odour of rubber in some articles.

Industrial Accidents and Diseases.—The number of fatal accidents in January in factories making chemicals, oils, soap, etc., was four. This, while not being the lowest figure among the trades listed in the current *Ministry of Labour Gazette*, compares very favourably with many other industries. Under the heading of industrial diseases, nine cases of epitheliomatous ulceration (skin cancer) are cited in January, in addition to one death from this disease, in the pitch, tar and oil industries. Seven cases of chrome ulceration are quoted, two in the manufacture of bichromates, four in chromium plating, and one under the heading of "other industries."

Controls Removed

REMOVAL of a further group of controls was announced by the President of the Board of Trade in the House of Commons on Tuesday. In making his announcement, Mr. Wilson said that all quota arrangements tended to hold back efficient firms while sustaining the inefficient.

The Government's policy, he claimed, had been one of progressively doing away with quotas wherever the supply position permitted. Since last November, 25 materials for use in more than 100 industries had been freed from this form of control.

Amendment of relevant statutory instruments could not all be done at once. The date from which the new relaxations became effective would therefore be announced separately.

The Official Report included removal of quantitative restrictions on the following:

Borax (non-statutory); boric acid (non-statutory); calcium chloride (non-statutory); caustic soda (non-statutory); cotton linters; furfural; oxalic acid (non-statutory); rennet casein (non-statutory); titanium dioxide (non-statutory); urea; white lead (non-statutory); woodpulp for cellulose wadding.

Other relaxations, some of which have already been announced, included the revocation of statutory control of distribution of matches in about four months' time. Change from public to private purchase was announced for pine oil; rosin; synthetic rubber-butyl and GRS; and turpentine. Reversion to private trade was brought into effect for tanning materials, and voluntary control use was removed for vermiculite.

Plastic Armour

Mr. Edward Terrell, Recorder of Newbury, Berks., and formerly a captain in the RNVR, has been awarded £9500 by the Royal Commission on Awards to Inventors for his war-time invention of plastic armour. Early in the war, when many ships were using sandbags or concrete blocks as an inadequate form of defence, Mr. Terrell set out to find a substitute for armour plating, then almost unobtainable.

In 10 days he invented plastic armour consisting of slabs of bituminous material filled with selected chips of hard stone and backed with thin steel plate. The perfected substance cost only £12 10s. a ton, compared with £150 a ton for armour-plating. By the end of 1945, 3000 merchant ships and over 1000 naval vessels had been fitted with it.

More Ardil.—I.C.I., Ltd., has announced plans for the extension of the former MoS factory at Drungals, Dumfries, for the manufacture of Ardil, the vegetable textile.

Personal

Dr. R. P. Linstead, who is to succeed Sir Ian Heilbron as professor of organic chemistry and director of the organic chemistry laboratories at the Imperial College of Science and Technology

MR. JOHN ANDERSON has been appointed deputy chief engineer in this country for Monsanto Chemicals, Ltd. He has served in the past with the Shell-Mex Company, and later became an I.C.I. executive engineer.

MR. HERBERT DEDICOAT, aged 36, senior analyst at Liverpool city laboratories since 1944, has been appointed chief analyst to Burnley Corporation.

DR. W. A. BELL, and MR. M. B. CATFORD have been appointed research chemist and research and development engineer, respectively, with the British Jute Trade Research Association, Dundee. Dr. Bell was, during the war, for five years a research chemist with I.C.I. at Billingham and Birmingham, engaged in atomic-energy work.

MR. RICHARD MAXWELL STOTHERT, governing director of Stotherts, Ltd., manufacturing chemists, Atherton, left £221,132.

Obituary

The death occurred suddenly last week at the age of 67 of PROF. C. H. LANDER, Dean of the Military College of Science and Emeritus Professor of Engineering in the Imperial College of Science and London University. The professor played a prominent part during the recent war in the development of gas turbines and jet propulsion for the Ministry of Aircraft Production and of flame-throwers and petrol-burners (FIDO).

Next Week's Events

MONDAY, MARCH 28

Institution of the Rubber Industry. Manchester: Engineers' Club, 6.15 p.m. Discussion evening.

TUESDAY, MARCH 29

Pharmaceutical Society. Manchester: Council Chamber, Houldsworth Hall, 7.45 p.m. Papers by Dr. C. Melville, H. Steinman, J. B. Lloyd, and H. Burlinson: "Different Aspects of Pharmacy."

Hull Chemical and Engineering Society. Hull: Church Institute, Albion Street, 7.30 p.m. A. P. Backshell: "The Beginnings of Industrial Safety."

Society of Instrument Technology. London: Manson House, Portland Place, W.1, 6.30 p.m. D. A. Oliver and D. Hadfield: "Modern Permanent Magnets for Instruments."

Institution of the Rubber Industry. London: Caxton Hall, Westminster, S.W.1, 7 p.m. Prof. H. W. Melville: "Redox Polymerisation."

WEDNESDAY, MARCH 30

Manchester Literary and Philosophical Society. Manchester: Portico Library, Mosley Street, 5.30 p.m. Dr. Hill: "Chemistry at the Shirley Institute."

Royal Institute of Chemistry. London: Gas Industries House, Grosvenor Place, S.W.1, 6.15 p.m. Joint meeting with B.A.C. and A.Sc.W. Part-time Education in Chemistry. J. Dimmick: "Organisation"; H. J. Barber: "Industrial Schemes"; P. C. L. Thorne: "Official Encouragement"; K. G. A. Pankhurst: "The Student's Viewpoint"; A. M. Ward: "Qualifications and their Status"; H. L. Howard: "Chemistry and Technology." Birmingham: University, Edmund Street, 6.30 p.m. Birmingham and Midlands Section, annual general meeting. Film: "Atomic Physics."

Institute of Metals. London: Institution of Mechanical Engineers, Storey's Gate, S.W.1. Annual general meeting. First day, 10 a.m. to 1 p.m. and 2.30 p.m. to 5 p.m., Institute business, presentation of the Institute of Metals (Platinum) Medal for 1949, and discussion of papers.

British Association of Chemists. Liverpool: University, 7 p.m. Demonstration of scientific apparatus.

THURSDAY, MARCH 31

The Chemical Society. London: Burlington House, W.1. 108th annual general meeting. 2.30 p.m., anniversary meeting; 3.30 p.m., presidential address; 7.30 p.m., dinner.

Institute of Metals. London: Institution of Mechanical Engineers, Storey's Gate, S.W.1. Annual general meeting. Second day, 10 a.m. to 1 p.m. and 2.30 p.m. to 5 p.m., symposium on Metallurgical Aspects of Non-ferrous Metal Melting and Casting of Ingots for Working. Savoy Hotel, 7.15 p.m., dinner and dance.

Royal Institute of Chemistry. Nottingham: Technical College, 7.15 p.m. Dr. Pearson: "Physical Chemistry and Metallurgical Research."

The Royal Society. London: Burlington House, W.1, 4.30 p.m. E. W. Yemm: "Respiration of Barley Plants—V"; H. E. Davenport: "Haemoglobins I, II, III."

FRIDAY, APRIL 1

The Chemical Society. London: Whole day meeting. Discussion: "Tracer Chemistry."

Society of Chemical Industry. Manchester: Engineers' Club, 6 p.m. Annual general meeting of the section, 6.45 p.m. Jubilee Memorial Lecture. H. V. Potter: "Synthetic Fibres."

Institute of Metals. London: 4 Grosvenor Gardens, S.W.1. Annual general meeting. Final day, 10 a.m. to 1 p.m., discussion of papers.

Society of Public Analysts and Other Analytical Chemists (Physical Methods Group). Nottingham: University. Symposium on Electrophoretic Analysis

The Royal Institution. London: 21 Albemarle Street, W.1, 9 p.m. S. Tolansky: "The Examination of Crystal and Metal Surfaces Using Interferometry."

Royal Statistical Society (Industrial Applications Section) London: E.L.M.A. Lighting Service Bureau, Savoy Hill, W.C.2, 6 p.m. C. Wainwright: "Statistical Principles in Quality Specifications for Plastics."

Industrial Safety Conference

Following the success of last year's gathering, additional accommodation has been booked at Scarborough for the National Industrial Safety Conference to be held from May 13-15, 1949. Speakers at the conference, which is being organised by the Royal Society for the Prevention of Accidents, will include Sir Geoffrey King, deputy secretary of the Ministry of Insurance, who will deal with the Industrial Injuries Act.

Overseas News Items

Uranium Mining in Saxony.—According to *Kurier*, a French-licensed Berlin daily paper, 31 new pits are being opened in the Johann Georgenstadt uranium mining area of Saxony, near the Czechoslovakian frontier.

Portuguese Hæmatite Deposits.—The Portuguese Government plans to develop hæmatite deposits occurring in the upper reaches of the Douro river. It is hoped to export ore to produce some steel, at least to cover home consumption.

Oil Refineries Again Under U.K. Control.—The oil refineries at Haifa, which have been in Israeli hands since last July, were handed back to British management last week. After the plant has been overhauled it is hoped to re-open it in May.

South African Embargo.—Included in the schedule of goods, the importation of which into South Africa has been prohibited by the Union Government's Notice No. 431, are the following: Cream of tartar and substitutes (acid phosphates of aluminium, calcium and sodium), ethyl acetate, animal and vegetable glycerine, fireworks and matches.

Nuclear Research in Sweden.—A new cyclotron designed by Prof. Manne Siegbahn in collaboration with the Asea Company is the latest addition to the equipment of the Royal Physical Institute of the Royal Academy of Science in Stockholm. A second cyclotron is being built at the Physico-Chemical Institute of Uppsala under Prof. T. Svedberg, and will be ready next autumn.

U.S. Enterprise in Palestine.—Four American concerns, Commonwealth Plastic Inc., American Full Mark Corporation, American Resinous Chemical Corporation, and Hardy, Remes and Co., are founding a new factory at Tel Aviv, Israel, for the production of synthetic raw materials for plastics and plastic products. This new enterprise will be known as Sharfon, Ltd. The managing director is Dr. Robert Nussbaum, and Dr. T. Berlin is technical director.

Dutch Chemicals for Israel.—A one-year trade agreement just concluded between the Netherlands and Israel provides for the shipment by the former of the following items: various chemicals (£20,000), organic acids (£15,000), aniline dyestuffs (£10,000), purified glycerine (£5000), saccharine (£5000), gelatine (£3000), manganese dioxide (£2000), pharmaceutical products (£40,000), also unspecified lacquers, varnishes, veterinary products as well as tar by-products and oil derivatives.

Danish Finance for Greenland Lead.—The Danish Financial Council has allocated Kr.100,000 for a scientific expedition which is to investigate the deposits of lead recently discovered in Greenland.

Rocket Testing.—Reports from Washington indicate that America may make use of Australia's 3000-mile rocket range as its future guided missile test centre. The maximum safe range at the U.S.A's testing area in New Mexico is about 500 miles.

Norway's Aluminium Output.—Prospects of increasing the production of aluminium from 30,000 to 95,000 tons a year are set out in Norway's recently published four-year plan. The new Ardal plant is now in production and two other companies are planning to achieve even greater output.

Soviet Potash for Holland.—According to a statement by a spokesman of the Hague Government, the price asked by the Soviet authorities for potash exceeds the 1947 price by 20 per cent. The Soviet is committed to deliver 40,000 tons of 40 per cent potash under the concluded trade agreement, but the exorbitant price forms a handicap.

Sulphur Production in U.S.A.—The U.S. sulphur industry produced 438,527 long tons of native sulphur during December to set a new record for a month's production, according to reports to the Bureau of Mines. The total production for the year 1948 was 4,869,211 long tons, which was also a record, exceeding by nearly 10 per cent the previous record of 1947.

New Polish Steel Mill.—The first of a number of new steel plants, which are intended to triple Poland's present annual steel output of 1.5 million metric tons, is at present under construction. Russian assistance is being given in this project, which entails the construction of a city to house some 100,000 workers. The U.S.S.R. authorities are said to have promised to equip for Poland large steel mills in Lower Silesia, near Zabrze (formerly Hindenburg).

U.S. Steel Production.—Steel production in the U.S.A. continues at record levels, operations at 100 per cent or more of rated capacity having been recorded for seven consecutive weeks. The American Iron and Steel Institute points out that only once before—in 1943—has the U.S. steel industry equalled such a rate. Total production for the two months was then 660,000 tons less than the 12,959,000 tons of raw steel for the seven-week period that began on January 17 this year.

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Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

CHEMRING, LTD., London, W.C. (M., 26/3/49.) February 11, mortgage or charge, to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; charged on certain contract moneys. *Nil. February 17, 1948.

GLAZ-LITE, LTD., London, N. (M., 26/3/49.) January 22, £1,744 10s. 6d. debenture, to K. H. W. Young, London; general charge. *Nil. December 14, 1948.

Satisfactions

LACRINOID PRODUCTS, LTD., Gidea Park. (M.S., 26/3/49.) Satisfaction February 14, of mortgage and charge registered November 9, 1948, to the extent of £40,000 (freehold premises at Eastern Avenue, Hornchurch having been released from the charge).

PEST CONTROL (UNITED KINGDOM), LTD. (formerly PEST CONTROL, LTD.), Bourn (Cambs.). (M.S., 26/3/49.) Satisfactions February 8, of mortgages or charges registered September 16, 1942 (two), March 13, 1943, June 12, 1945, February 12, 1946 (one), February 14 (two), and April 6, 1948,

Company News

British Aluminium Co. — Preliminary figures for 1948 showed a total profit of £1,860,142, a decrease of £272,670 from the previous year. The final ordinary dividend, payable on April 21, is unchanged at 6 per cent, making a total of 10 per cent (same).

E. I. du Pont de Nemours' report for 1948 showed a new record for sales of $986.7 million. Net profit was $157.445 million (equal to $13.12 a common share), compared with $120.01 million ($9.88 a share) in 1947.

The following increases in registered capital are announced: **Midland Tar Distillers, Ltd.**, from £650,000 to £1,000,000; **Mody & Co., Ltd.**, from £2000 to £48,000; **Speedoil (Great Britain), Ltd.**, from £500 to £3573; **Syn-Gel, Ltd.**, from £100 to £10,100; **Ethical Products, Ltd.**, from £100 to £15,000.

New Companies Registered

H. Gelpke, Ltd. (465,630). Private company. Capital £5000. Manufacturers of coal tar products, chemicals, fertilisers, etc. Directors: H. Gelpke, 52 Woodcote Grove Road, Coulsdon, and P. J. Bate.

Landley, Ltd. (465,634). Private company. Capital £500. Manufacturers of chemicals and chemical, metallurgical and minerological products, etc. Director: W. C. Strickland. Reg. office: 13 Warrior Square, St. Leonard's-on-Sea.

Meta Mica, Ltd. (465,708). Private company. Capital £5000. Refiners, processors and appliers of vermiculite and similar minerals, etc. Directors: H. Vincent, E. J. Pugh. Solicitors: Gery & Brooks, 55 Welbeck Street, W.1.

J. Strother & Co., Ltd. (465,826). Private company. Capital £2000. Manufacturers of detergents, soaps, weed and vermin killers, etc. Directors: J. Strother, W. H. Phillips. Reg. office: 2 Westmoreland Road, S.E.17.

C. G. Templer & Co., Ltd. (465,796). Private company. Capital £15,000. Manufacturers of cements, compounds, fillers, chemicals, refractory materials, etc. Directors: C. G. Templer, P. J. Templer. Reg. office: 109 Bollo Bridge Road, Acton, W.3.

Thor Utilities, Ltd. (26,876). Private company. Capital £500. Bleach manufacturers, chemical merchants, etc. Directors: H. W. Thorburn, P. M. D. Thorburn. Reg. office: 288 High Street Kirkcaldy.

Chemical and Allied Stocks and Shares

FOLLOWING their recent heavy fall, there has been a moderate recovery in the industrial and kindred sections of the Stock Exchange. This has been due mainly to a cessation of the selling which prevailed in recent weeks, although the lower prices and good yields attracted a little buying. Markets are, however, continuing to show mainly a waiting attitude because it is difficult to assess the outlook until after the Budget.

Firmness has again prevailed in British Funds based on the belief that big operations are pending in the gilt-edged market. Terms of the £200 million of British Gas stock are due to be announced on May 1.

Chemical and kindred shares have shown a better tendency in accordance with the prevailing market tendency. Moreover, sentiment was helped by the increased

profits announced by Monsanto Chemicals. Monsanto 5s. shares, after being 53s. 9d., strengthened to 55s., at which there is a yield of rather more than 4 per cent on the basis of the unchanged 45 per cent dividend.

Imperial Chemical have firmed up to 45s. 3d. and yield over 4⅜ per cent. There is, of course, general confidence persisting that the I.C.I. dividend total will again be 10 per cent, although larger capital ranks for the final payment. Elsewhere, Burt Boulton eased to 27s. 6d.; Fisons at 58s. have remained under the influence of the good impression created by the higher profits reported for the past year. Brotherton 10s. shares changed hands around 20s. 6d. In other directions, Laporte 5s. ordinary were 20s., Albright & Wilson 29s. 9d., Amber Chemical 2s. shares 8s., Boake Roberts 5s. shares 31s. 3d., and Bowman Chemicals 4s. ordinary were 7s.

British Chemicals and Biologicals 4 per cent preference eased to 20s. 9d. following the financial results. W. J. Bush 5 per cent preference were 26s., with L. B. Holliday 4½ per cent preference 22s. 4½d. Sanitas Trust 10s. ordinary were 25s. 9d.

Turner & Newall have changed hands around 76s. 9d.; United Molasses (42s. 3d.) also showed a moderate rally. British Oxygen were 98s. 9d., awaiting the results which may also give news of new capital plans, but Dunlop Rubber have fallen sharply to 66s. Elsewhere, Triplex Glass eased to 21s. 9d., and Glaxo Laboratories were £19½, with British Drug Houses 5s. shares 8s. 3d.

Despite the surprise increase in the dividend, Amalgamated Metal moved slightly lower at 19s. 7½d. De La Rue at 35s. 9d. rallied on the official statement that profits for the group will be at a record level despite losses made by two subsidiaries, De La Rue Insulation and De La Rue Gas Development.

British Glues 4s. ordinary were 19s. 3d., and British Industrial Plastics 2s. shares 5s. 7¼d., with Kleemann at 17s. 3d. and other shares of companies with plastics interests also better. British Xylonite changed hands at close on £5. British Match eased to 36s., but Swedish Match shares were better at 27s. 9d.

Iron and steels have been steady generally, with Dorman Long 32s. 4½d., United Steel 30s., Thomas & Baldwins 15s. 1½d., and Stewarts & Lloyds 56s. 10½d. Babcock & Wilcox firmed up to 67s. 3d. and Ruston & Hornsby to 60s.

Boots Drug rallied to 51s. 3d., Sangers were 33s., and Beechams deferred 15s. 9d. General Refractories at 23s. 6d. remained under the influence of the good results and higher dividend. Oils reflected the better trend of markets, Anglo-Iranian being £8⅛ and Shell 66s. 10½d., but Trinidad Leaseholds eased to 25s. 3d., and later other oil shares came back again.

Changing Scottish Technique

Advances in Light Engineering

NUT and bolt production in Scotland is expanding steadily and has latterly adopted new mechanised systems to overcome the general labour shortage. Some current trends have been reviewed by A. P. Newall and Co., Ltd.

Bolts giving a high power-to-weight ratio are now being manufactured extensively, from medium carbon steel of about 0.35 per cent carbon and with a tensile strength of 45 to 55 tons p.s.i. For more exacting work manganese-molybdenum alloy steel of a breaking strength 60 to 75 tons p.s.i. is being used.

Oilfield work is being given special attention with nickel-chromium-molybdenum bolts and nuts. Such bolts stand up to the exacting pressures in oil refinery work, and do not expand and contract in the way associated with the conditions involved to the same extent as does mild steel. Cold swaging has been developed extensively to reduce the shank diameter on bolts, while leaving a surface free from scratches.

By the use of cylindrical dies, the firm claims to have overcome the problem of producing threads on heat-treated, high-tensile steels. The threads are formed by squeezing out the root from a blank of a size which is the mean of the root and crest diameters, and the metal so displaced forms the crest of the thread. This contrasts with cutting the thread from the full diameter by machining or grinding and the "generated" thread is stated to be about 25 per cent stronger under fatigue load than the cut thread.

New Expansion Joint

A pipe expansion joint, which is said to permit a greatly increased range of expansion, compared with the normal joint fitted to pipes conveying hot fluids, is the subject of Patent 603,852 by A. Walsh and the Dunlop Rubber Co., Ltd. The specification shows a pair of pipe ends united by the new joint, the pipe flanges clamping a V-section of an internal fabric faced on both sides with rubber. Either natural or synthetic rubber is used, according to the nature of the fluid conveyed. A pair of inextensible wires in beads on the innermost diameter is used, as in motor tyre construction. The joint has holes for the flange studs to pass through and these are screwed into an inner ring which may be replaced by a series of segments for greater convenience in assembling.

Prices of British Chemical Products

STEADY conditions in which there has been little change characterise most sections of the industrial chemicals market; the overall improvement in the flow of supplies appears to be no more than is required to meet current needs. The demand from the textile, bleaching and finishing trades has been fully maintained both as regards contract deliveries and new bookings. Among the soda products, all the routine items continue in steady request and buyers are pressing for deliveries of chlorate of soda. The solvents are in active demand and a fairly active interest is also reported for bleaching powder, hydrogen peroxide, formaldehyde and British-made barium chloride. Buying for shipment has been on a fair scale. Pitch has again been the most active item in the coal-tar products market, the export demand continuing steady. All the pyridines are quoted at firm rates on a good demand and shipments of creosote oil are reported to be satisfactory.

MANCHESTER.—Steady to firm price conditions have been reported during the past week in virtually all sections of the Manchester market for chemical and allied products. The cotton and woollen textile industries are taking steady deliveries of a wide range of materials and there has been no apparent falling off in the demands from other leading industrial outlets. The past few days have seen a fair amount of new inquiry in the market and replacement buying is on steady lines. In overseas business, the aggregate volume seems to have been well maintained in the alkali and other principal lines. In the fertiliser market a steady movement of supplies of superphosphates and the compounds has again been reported.

GLASGOW.—There has been a slight improvement in the total turnover in the Scottish chemical market, reflecting the slightly better tone in industry in general. Certain types of trading, however, showing a lower turnover than would be expected. There has been no unusual demand, and no noteworthy change in the supply position. The export market has been a little quieter, but still active.

Price Changes

Rises: Alum, cobalt oxide, lactic acid, pyridine.

Reductions: Cream of tartar, white lead.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton, £64; 80% pure, 1 ton, £66; commercial glacial 1 ton £79; delivered buyers' premises in returnable barrels: £4 10s. per ton extra; in glass carboys, £7, demijohns, £11.

Acetic Anhydride.—Ton lots, d/d, 11¾d. per lb.

Acetone.—Maximum prices per ton, 1/5 tons, £76 10s.; single drums, £77 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alcohol, Industrial Absolute.—50,000 gal. lots, d/d, 2s. 7¾d. per proof gallon; 5000 gal. lots, d/d, 2s. 10¾d. per proof gal.

Alum.—Loose lump, £17 per ton, f.o.r. MANCHESTER: Ground, £17 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER: £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate. — MANCHESTER: £48 per ton d/d.

Ammonium Carbonate.—£48 per ton d/d in 5-cwt. casks. MANCHESTER: Powder, £50 d/d.

Ammonium Chloride. — Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £21 to £25 per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate.—MANCHESTER: £5 per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £78 and £76 10s. per ton.

Antimony Oxide.—£162 10s. per ton.

Antimony Sulphide.—Golden, d/d, as to quantity, etc., 4s. to 5s. per lb.

Arsenic.—Per ton, £40 5s. to £41 5s., according to quality, ex store.

Barium Carbonate.—Precip., d/d; 2-ton lots, £25 15s. per ton, bag packing, ex works.

Barium Chloride.—£35 to £35 10s. per ton.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £26 10s. per ton d/d; 2-ton lots, £26 15s. per ton.

Bleaching Powder.—Spot, 35/37%, £11 10s. per ton in casks.

Borax.—Per ton for ton lots, in free 1-cwt. bags, carriage paid: Commercial, granulated, £30; crystals, £31; powdered, £31 10s.; extra fine powder, £32 10s. B.P., crystals, £39; powdered, £39 10s.; extra fine, £40 10s. Borax glass, per ton in free 1-cwt. waterproof paper-lined bags, for home trade only, carriage paid: lump, £77; powdered, £78.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granulated, £52; crystals, £53; powdered, £54; extra fine powder, £56. B.P., crystals, £61; powder, £62; extra fine, £64.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £8 12s. 6d. per ton, in 4 ton lots.

Charcoal, Lump.—£25 per ton, ex wharf. Granulated, £30 per ton.

Chlorine, Liquid.—Nominal, d/d in 16/17-cwt. drums (3-drum lots).

Chrometan.—Crystals, 5½d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6¾d., other, 1s. 5.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Cobalt Oxide.—Black, delivered, 7s. 7½d. per lb.

Copper Carbonate.—MANCHESTER: 1s. 6½d. per lb.

Copper Chloride.—(53 per cent), d/d, 1s. 10½d. per lb.

Copper Oxide. — Black, powdered, about 1s. 4½d. per lb.

Copper Nitrate.—(53 per cent), d/d, 1s. 8½d. per lb.

Copper Sulphate.—£42 10s. per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £7 8s. per 1-2 cwt. lot, d/d.

Ethyl Acetate.—10 tons and upwards, d/d, £115 per ton.

Formaldehyde.—£31 per ton in casks, according to quantity, d/d. MANCHESTER: £32.

Formic Acid.—85%, £64 per ton for ton lots, carriage paid. 90%, £67 5s. per ton.

Glycerine.—Chemically pure, double distilled 1260 s.g. £123 per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 7s. 6d to 8s 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—1s. 0½d. per lb. d/d, carboys extra and returnable.

Iodine.—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.

Iron Sulphate.—F.o.r. works, £3 15s. to £4 per ton.

Lactic Acid.—Pale, tech., £80 per ton; dark tech., £70 per ton ex works; barrels returnable.

Lead Acetate.—White, 130s. to 138s. per cwt.

Lead Carbonate.—British dry, ton lots, d/d. £146 per ton.

Lead Nitrate.—About £135 per ton d/d in casks. MANCHESTER: £125.

Lead, Red.—Basic prices per ton: Genuine dry red lead, £137 10s.; orange lead, £149 10s. Ground in oil: red, £159 10s., orange, £171 10s. Ready-mixed lead paint: red, £163, orange, £175 (subject to increase of £1 10s. per ton).

Lead, White.—Dry English, in 8-cwt. casks, £146 per ton. Ground in oil, English, 50-100 ton lots, £158 per ton.

Lime Acetate.—Brown, ton lots, d/d, £18 to £20 per ton; grey, 80-82 per cent, ton lots, d/d, £22 to £25 per ton.

Litharge.—£137 10s. per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £18 5s.

Magnesium Carbonate.—Light, commercial, d/d, £70 per ton.

Magnesium Chloride.—Solid (ex wharf), £27 10s. per ton.

Magnesium Oxide.—Light, commercial, d/d. £160 per ton.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., lump, 7s. 4d.; smaller quantities dearer.

Mercurous Chloride.—8s. to 9s. per lb., according to quantity.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 4s. 8d. per gal.; pyridinised 64° O.P. 100 gal., 4s. 11d. per gal.

Nickel Sulphate.—F.o.r. works, 3s. 4d. per lb.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—£128 to £133 per ton packed in free 5-cwt. casks.

Paraffin Wax.—Nominal.

Phosphoric Acid.—Technical (S.G. 1.500), ton lots, carriage paid, £61 per ton; B.P. (S.G.1.750), ton lots, carriage paid, 1s. 1d. per lb.

Phosphorus.—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.

Potash, Caustic.—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate. — Crystals and granular, 9⅜d. per lb.; ground, 10⅜d. per lb., for not less than 6 cwt.; 1-cwt. lots, ¼d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £64 per ton for 1-ton lots, ex store: hydrated, £58 for 1-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Chloride.—Industrial, 96 per cent, 6-ton lots, £16.10 per ton.

Potassium Iodide.—B.P., 11s. 1d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 8½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 8d. per lb.; technical, £7 14s. 3d. to £8 6s. 3d. per cwt., according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £21 to £25 per ton, in casks, ex store.

Salicylic Acid.—MANCHESTER: 1s. 11d. to 3s. 1d. per lb. d/d.

Soda Ash.—58° ex depôt or d/d, London station, £7 12s. 6d. to £8 7s. 6d. per ton.

Soda, Caustic. — Solid 76/77%; spot, £19 per ton d/d.

Sodium Acetate.—£41-£55 per ton.

Sodium Bicarbonate.—Refined, spot, £11 10s. per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 8d. per lb.; anhydrous, 7½d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite. — Powder, 60/62%, £28 7s. 6d. per ton d/d in 2 ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£52 to £57 per ton.

Sodium Cyanide.—100 per cent basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite.—Pea crystals 22s. 6d. per cwt. (2-ton lots); commercial, 1-ton lots, £16 per ton carriage paid. Packing free.

Sodium Iodide.—B.P., 10s. 2d. per lb. to 12s. 1d. according to quantity.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £103 ton.

Sodium Metasilicate.—£19 to £19 5s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98 per cent, 6-ton lots, d/d station, £20 10s. per ton.

Sodium Nitrite.—£29 10s. per ton.

Sodium Percarbonate.—12½% available oxygen, £7 per cwt. in 1-cwt. drums.

Sodium Phosphate.—Di-sodium, £32 10s. per ton d/d for ton lots. Tri-sodium, £62 per ton d/d for ton lots.

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Silicofluoride.—Ex store, nominal.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground, £6 per ton d/d station in bulk. MANCHESTER: £6 5s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot, £23 per ton, d/d, in drums; broken, £23 15s. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £14 12s. 6d. to £16 17s. 6d., according to fineness.

Sulphuric Acid.—168° Tw., £6 10s. to £7 10s. per ton; 140° Tw., arsenic free £5 2s. 6d. per ton; 140° Tw., arsenious, £4 15s. per ton. Quotations naked at sellers' works.

Tartaric Acid.—Per cwt: 10 cwt. or more £9; 5 to 9 cwt. £9 2s.; 2 to 4 cwt. £9 4s.; 1 cwt. £9 6s.

Tin Oxide.—1-cwt. lots d/d £25 10s.

Titanium Oxide.—Comm., ton lots, d/d, (56 lb. bags), £102 per ton.

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d; white seal, £101 15s.; green seal, £100 15.; red seal, £99 5s.

Zinc Sulphate.—£34 per ton.

Rubber Chemicals

Antimony Sulphide.—Golden, 4s. to 5s. per lb. Crimson, 2s. 7½d. to 3s. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £8 3s. 6d. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

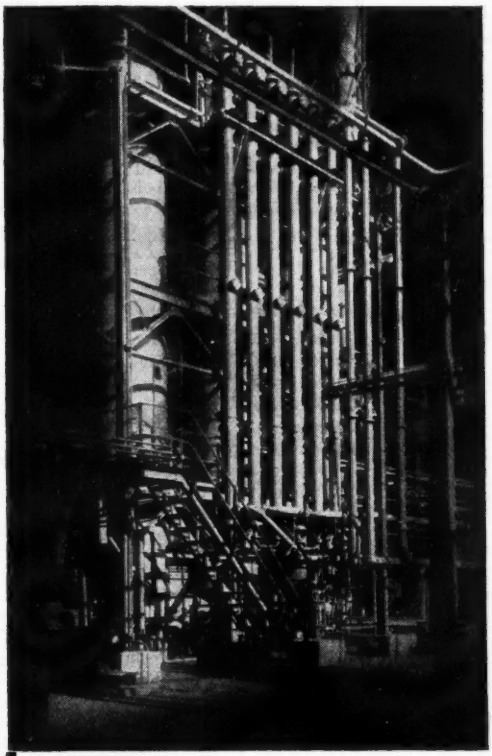
Carbon Bisulphide.—£37 to £41 per ton, according to quality, in free returnable drums.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£56 to £59 per ton, according to quantity.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 10 5/16d. to 1s. 5½d. per lb.; dark, 10¼d. to 1s. per lb.



COMPLETE CHEMICAL PLANT

Plant for the production, purification and catalytic conversion of synthesis gases

Nitrogenous fertiliser plant

Nitric acid production and concentration plant

Sulphuric acid production and concentration plant

Electrolytic plant

Plant for production and processing of oils and fats for edible and technical purposes

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SLOane 9282 Cables: Bamag, London

29/1

Lithopone.—30%, £36 15s. per ton.
Mineral Black.—£7 10s. to £10 per ton.
Mineral Rubber, "Rupron."—£20 per ton.
Sulphur Chloride.—7d. per lb.
Vegetable Lamp Black.—£49 per ton.
Vermillion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Phosphate.—Not quoted—temporarily unobtainable.
Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, in January, £10 6s. 6d., rising by 1s. 6d. per ton per month to March, 1949.
Calcium Cyanamide.—Nominal; supplies very scanty.
Compound Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. No. 1 grade, where available, £10 14s. 6d. I.C.I. Special No. 1, £16 11s., rising by 2s. 6d. per ton per month to March, 1949.
"Nitro-Chalk."—£10 4s. per ton in 6-ton lots, d/d farmer's nearest station.
Sodium Nitrate.—Chilean for 6-ton lots d/d nearest station, £11 per ton.

Coal-Tar Products

Benzol.—Per gal. ex works: 90's, 2s. 6d.; pure, 2s. 8½d.; nitration grade, 2s. 10½d.
Carbolic Acid.—Crystals, 11½d per lb. Crude, 60's, 4s. 3d. MANCHESTER: Crystals, 10½d. to 1s. 0½d. per lb., d/d crude, 4s. 3d., naked, at works.
Creosote.—Home trade, 6½d. to 9¾d. per gal., according to quality, f.o.r. maker's works. MANCHESTER: 6½d. to 9¾d. per gal.
Cresylic Acid.—Pale, 98%, 3s. 9d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 4s. 4d. per gal.
Naphtha.—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.
Naphthalene.—Crude, ton lots, in sellers' bags, £8 1s. to £12 13s. per ton according to m.p.; hot-pressed, £14 15s. to £15 14s. per ton, in bulk ex works; purified crystals, £28 to £43 5s. per ton. Controlled prices.
Pitch.—Medium, soft, home trade, 100s. per ton f.o.r. suppliers' works; export trade, £8 5s. to £9 5s. per ton f.o.b. suppliers' port. MANCHESTER: 100s. f.o.r.
Pyridine.—90/140°, 21s. 6d. to 22s. 6d. per gal.; 90/160°, 19s. MANCHESTER: 19s. to 22s. per gal.
Toluol.—Pure, 3s. 2½d. per gal.; 90's, 2s. 4d. per gal. MANCHESTER: Pure, 3s. 2½d. per gal. naked.
Xylol.—For 1000-gal. lots, 3s. 3½d. to 3s. 6d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton; grey, £22.
Methyl Acetone.—40/50%, £56 to £60 per ton.
Wood Creosote.—Unrefined, from 3s. 6d. per gal., according to boiling range.
Wood Naphtha.—Miscible, 4s. 6d. to 5s. 6d. per gal.; solvent, 5s. 6d. to 6s. 6d. per gal.
Wood Tar.—£6 to £10 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.
o-**Cresol** 30/31° C.—Nominal.
p-**Cresol** 34/35° C.—Nominal.
Dichloraniline.—2s. 8½d. per lb.
Dinitrobenzene.—8½d. per lb.
Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.
p-**Nitraniline.**—2s. 5d. per lb.
Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.
Nitronaphthalene.—1s. 2d. per lb.; P.G. 1s. 0½d. per lb.
o-**Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.
p-**Toluidine.**—2s. 2d. per lb., in casks.
m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—March 23.—For the period ending April 2, 1949, for unrefined oils (March 26 for refined oils). Per ton, naked, *ex* mill, works or refinery, and subject to additional charges according to package; LINSEED OIL, crude, £170; foots, £120. CASTOR OIL, firsts, £142; seconds, £135. COCONUT OIL, crude, £106; refined deodorised, £112; refined hardened deodorised, £116. RAPESEED OIL, crude, £190. PALM KERNEL OIL, crude, £105 10s., refined deodorised, £112; refined hardened deodorised, £116. PALM OIL (per ton c.i.f.), in returnable casks, £99 5s.; in drums on loan, £98 15s., in bulk, £97 15s. GROUNDNUT OIL, crude, £110 10s.; refined deodorised, £114; refined hardened deodorised, 40°, £118. WHALE OIL, blubber, £60. ACID OILS, groundnut, £94; soya, £92; coconut and palm-kernel, £97 10s. ROSIN: wood, 24s. to 58s.; gum, 51s. 6d. to 59s. 6d. per cwt., ex store, according to grade. TURPENTINE, American, 74s. per cwt., Portuguese, 64s. per cwt. in drums or barrels, as imported (controlled price).

Undersupplied Market

Shortage Conditions Prevalent in Egypt

INADEQUACY of home-produced chemicals is thought to contribute largely to the maintenance of high prices for chemicals and commodities in Egypt. Since the war, imported chemicals have come mainly from England, and a small local production has increased the number of products available.

Demand for caustic soda annually is some 12,000 tons higher than the supply. Local production by three factories is about 5800 tons a year, but the imported English product is preferred. Small quantities are available from Holland, France and Italy, but their prices are generally higher.

The Egyptian Ministry of Industry and commerce has been studying all means of increasing production. An electrolysis plant is being constructed by the Kafr-el-Zayat Cotton Company, which will produce 2000 tons of caustic soda a year, but it will take two years to complete.

During the war, research was carried out with a view to manufacturing sodium carbonate, but without result and there is a black market in this product. France has exported a small quantity into Egypt, but England provides most.

Main sulphuric acid producer is the Financial and Industrial Company of Egypt, whose plant at Kafr-el-Zayat has a capacity for 35 tons daily. Other products manufactured include superphosphates, hydrochloric acid, iron sulphate, ether, soda fluosilicate, sodium sulphate, etc. The company is constructing a new plant to produce 80 tons daily. A new company, Abu Zaabel and Kafr et Zayat Fertiliser and Chemical Co. will shortly produce 40 tons of sulphuric acid daily of which 75 per cent will be used to produce 80,000 tons of superphosphate annually.

A large market is said to prevail for chemical products in Egypt. Preference in certain products, such as aniline salts, sodium sulphide, is for English goods.

German Patents

Bids Invited by Sweden

THE impending disposal of further German-owned Swedish patents has recently been announced from Stockholm. The following patents are to be offered for sale by the Foreign Capital Control Office (Flyktapitabyran) of the Swedish Government :—

Method for producing—ascorbic acid (124148); drying adhesives for insulating coatings (124201); moulded masses of cellulose esters and ethers (124277); metal or metal alloys (124282); nitrogenous condensation products (124349); condensation products of terpenes and aromatic oxy-compounds (124388); divinylic sulphide and homologues thereof (124435); absolutely adhering foundation enamel (124490); producing foam (124495).

Other patents included: Fan wheel, resistant to attacks by chemical substances (124163); safety valve for boilers (124352); bandage material (124380); optic or inspection tube for inside inspection for testing gun bores, etc. (124394); shutting-off device, preferably for safety valves.

Bids are required by the Foreign Capital Control Office ((Flyktapitalbyran) Hovslagaregation 2, Stockholm, by April 15. The requirement to secure currency exchange authorisation from the Foreign Exchange Control, the Bank of England, still continues.

Process Control Terms

A complete glossary of terms used in process control is now being published, in four sections, by the British Standards Institution.

The first of these, Section 2, is now issued as BS 1523, and covers terms used in automatic controlling and regulating systems of the closed-loop type, namely, systems in which the actual value of the controlled condition is continuously compared with the desired value.

Section 3, dealing with nomenclature of position, control servo-mechanism, is in course of preparation and Section 4, on automatic regulators will follow. Section 1, containing terms common to all automatic controlling and regulating systems of the closed loop type, will come later.

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OF GREAT BRITAIN

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SITUATIONS VACANT

None of the vacancies in these columns relates to a man between the ages of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that order.

AN expanding Middle East Oil Company urgently requires an Assistant Engineer to work initially in the London Office and be willing to accept transfer to the Persian Gulf after one year. Should possess B.Sc. Degee in Chemical or Mechanical Engineering. Will be required to assist in duties involving loading and bunkering facilities, oil gas distribution, and other oil control duties. Some experience of these duties essential. Experience in oil bunkers control with docks operating group of the Royal Engineers may be advantageous. Age 25–30. Salary starting £600-£700 per annum according to age and experience. Write, giving brief details, for application form, and quoting LO 133, to **Box "P.Y.,"** c/o **J. W. Vickers & Co., Ltd., 7/8, Great Winchester Street, London, E.C.2.**

THE LIVERPOOL GAS COMPANY

APPLICATIONS are invited for positions on the Chemical Staff of the Liverpool Gas Company. Applicants should be qualified either by examination or experience in Science, Fuel Technology or the Carbonising industry.

The initial salary will be in accordance with the qualifications and experience of the successful applicants, rising in approved cases to an annual salary of £525.

The successful applicants will be required to pass the usual pre-employment Medical Examination and will be required to contribute to the Official's Superannuation Fund.

Application should be made on the official form, obtained by writing to the **Personnel Superintendent, 18/26, Bold Street, Liverpool, 1,** and should be returned to him on or before the 11th April, 1949. Copy, not original references should be enclosed.

SITUATIONS VACANT

APPLICATION is invited for the position of **Maintenance Workshops and Installation Engineer** for an important Chemical Works, Manchester area. Applicant should not be over 40 years of age, with Engineering Degree, A.M.I.Mech.E., or equivalent. Practical experience in Maintenance, Chemical Plant Erection and Design essential. Position offered is permanent and progressive. Only men of proved ability need apply. Address in first instance, with particulars of qualifications and experience in detail, and salary expected. Box No. 2784, THE CHEMICAL AGE, 154 Fleet Street, London, E.C.4.

CHEMICAL Manufacturers in South of England wish to appoint a qualified **Chemical Engineer** around 30-40 years, to be responsible for development of new plant. Applicants should have a Chemical Engineering Degree, or be similarly qualified, and have had considerable experience in a similar capacity.

Initial salary will be up to £800 per annum, according to qualifications and experience, and progress can be anticipated. Staff conditions are in line with best modern practice and include attractive contributory pension and life insurance scheme. Write, marking envelope "Confidential, Ref. CA/GE," and giving particulars of experience and qualifications and salary expected to Box No. 2787, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

CHEMIST or Physicist required to be responsible for the production of short lived radioactive preparations. Permanent and progressive position. Superannuation fund provided. Apply, giving particulars of training, experience, qualifications, age and salary required to Box No. 2786, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

PETROCARBON LIMITED require Assistant Mechanical Engineer. The position is a permanent one with an attractive salary and prospects for an applicant with proved technical and practical ability in general engineering, coupled with experience in workshop organisation, management and labour control. Previous experience in chemical plant maintenance would be an advantage. Applications, in the first instance, in writing, to **Personnel Manager, Petrocarbon Limited, Partington Industrial Estate, Urmston, Manchester.**

REQUIRED, **Three Production Chemists,** for training as Shift Supervisors in Chemical Factory. Applicants should possess B.Sc. Degree or equivalent, and should preferably have had some industrial experience. Age group up to 30. Good prospects to right men. Apply, giving full details and salary required, to **THE FULLER'S EARTH UNION, LTD., Patteson Court, Nutfield Road, Redhill.**

SITUATION WANTED

CHEMIST, B.Sc., A.R.I.C., many years senior responsible position in leading light engineering concern, paints, plating, vitreous enamel, metal surface treatment, etc., production and laboratory control, sales and service liaison. Would like change. Technical, Technical-Commercial, Industrial Consultant. London area. Box No. 2785, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

WORKING NOTICE

THE proprietor of British Patent No. 567634, entitled "Improvements in or relating to tubular furnaces for distilling or cracking processes," offers same for licence or otherwise to ensure practical working in Great Britain. Inquiries to SINGER, EHLERT, STERN & CARLBERG, 28E. Jackson Boulevard, Chicago 4, Illinois, U.S.A.

FOR SALE

GEORGE 600 COHEN'S

ROTARY COOLER, 35 ft. long by 4 ft. diam. constructed ⅜ in. plate. Drive by 7 h.p. motor.

Three unused secondhand Broadbent centrifugal **HYDRO EXTRACTORS** with 48 in. diam., Staybrite steel basket, perforated type. Direct underdriven (pit type) from vertical spindle motor 420 volts D.C., 950 r.p.m. Handbrake, self locking. Monitor casing mild steel Staybrite gauge lining to baskets

Two unused secondhand Broadbent centrifugal **SEPARATORS** with 48 in. diam. Staybrite solid baskets. Hand operated skimming gear.

MIXER/DRIER by Simon. Horizontal unjacketed trough type. Internal dimensions approx. 8 ft. long by 2 ft. 6 in. deep by 2 ft. 8 in. wide. Agitator bank of 16 solid drawn tubes approx. 6 ft. 6 in. long by 2¾ in. o.d. 8 in. square bottom side discharge. Bottom half of Mixer removable.

Buell (Buttner system) **ROTARY DRYING PLANT,** comprising rotary drier, 34 ft. 6 in. long by 6 ft. 11 in. diam. constructed ⅜ in. mild steel plate with discharge equipment, fan, dust separator system, screw and drag link conveyors, bucket elevators, but excluding electrical equipment.

Duplex **MIXING AND KNEADING MACHINE** by Morton of Wishaw. Steam jacketed trough size approx., 42 in. by 38 in. by 30 in. Working capacity 115 gallons. Fitted twin gunmetal mixing blades double Naben type. Suitable for internal working pressure of 15 lb. per sq. in. or high vacuum.

Several compound **BALL/TUBE MILLS** by W. Johnson of Leeds. Dimensions approx. 12 ft. long by 3 ft. 6 in. diam. arranged for belt drive through gearing. Complete with charge of flints and steel balls.

Two **HYDRO EXTRACTORS** by Broadbent, 48 in. diam. perforated baskets. Three point suspension. Steam driven.

Two three-throw **HOMOGENISERS** by Rannie, each 110 gallons per hour capacity. Overhauled and fitted with new stainless steel rams and pump block arranged for vee rope drive with motor mounting over pump; no motor available. Unused since complete overhaul.

Alfa Laval centrifugal **SEPARATOR,** type R.275, enclosed pattern, completely overhauled and internal fittings replated. Unused since. Complete with motor and vee belt drive.

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MIXING PLANT

THREE—200-gal. Unjacketed Open-top Mild Steel Mixing Pans, 3 ft. diam. by 4 ft. 6 in. deep, with overdriven stirring gear, fast and loose pulleys, 2-in. run-off. (New and unused.)

FOUR—40-gal. Steam-jacketed Open-top Welded Mild Steel Mixing Pans, 2 ft. diam. by 2 ft. deep. 50 lb. per sq. in. w.p. with overdriven stirring gear. (New and unused.)

ONE—40-gal. Ditto, copper lined, with bronze propeller-type agitator, arranged overdriven reversing gear.

ONE—200-gal. Enclosed Electrically-heated Mixer, 3 ft. diam. by 4 ft. 6 in. deep galvanised throughout, with overdriven stirring gear. 8 kW. heating, 230 volts, single-phase, 50 cycles. (NEW.)

TWO—150-gal. Enclosed Pressure Mixers, 3 ft. diam. by 3 ft. deep with 1 ft. 6 in. conical bottom, over-driven stirring gear, fast and loose pulleys. (Unused.)

ONE—New and unused Gardner "Rapid" Steam-jacketed Mixer and Drier, 2 ft. 3 in. wide by 2ft. 6 in. deep by 6 ft. 3 in. long, gear wheel and pinion drive from fast and loose pulleys.

ONE—New "Morward" Dry Powder Mixer, 2 ft. wide by 2 ft. deep by 6 ft. long, inbuilt drive through reduction gearbox from 6 h.p. motor, complete with starter, 400/3/50.

Also

New Mixing Plant, constructed to requirements. Inquiries invited. Prompt delivery.

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AIR Compressor, Vertical, belt driven, 8-in. cyl. by 6-in. stroke, flywheel and pulley drive. £40. THOMPSON & SON (MILLWALL), LTD., Cuba Street, London, E.14.

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CRUSHER, by Harrison Carter, 12 in. by 12 in. by 12 in., with Crofts 3½ h.p. geared motor. £100. THOMPSON & SON (MILLWALL), LTD., Cuba Street, London, E.14.

GEARED MOTORS, ALL SIZES IN STOCK.
1½ h.p. 200/240v. D.C. Final r.p.m. 50, £35.
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Drum cell type. 4 ft. 7½ in. diameter × 2 ft. 7½ in. wide. Filter surface 35 sq. ft. 2 h.p. 4-speed motor with starter. Makers, International Combustion Co. Ltd. Brand new condition £1,350

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Artofex Dough Mixer, 34 in. revolving bowl, electric driven.
Unused "Weir" Tubular Condenser, 140 sq. ft.
Jacketed Cylindrical Vacuum Oven, 7 ft. by 3 ft. (unused).
3 ft. 6 in. stainless coated Edge Runner by Torrance.
Filter Press, 30 chambers, 26 in. by 26 in.

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SEVERAL small steam-jacketed Copper Pans.
Several Ball Mills, 6 ft. 6 in. by 6 ft. 8 in., Silex-lined batch type, with driving gear and clutch.
3 Simon type Portable Slat Conveyors, 20 ft. long, for boxes or bags.
Mixing Pan, 6 ft. dia. by 5 ft. deep, flat bottom, open top.
Ditto, 3 ft. dia. by 5 ft. deep, flat bottom, open top.
2—6 in. Centrifugal Pumps by Cherry.
Milton Grinders fitted with 30 in. vertical stones, belt driven with shaker feeds.
1 Iwel 20 in. Turbine Centrifugal Extractors with spare baskets.
Steam Jacketed Gardner pattern Mixer about 30 gallons capacity.
4 vertical Hall Ammonia Compressors, single cylinder, belt driven cylinders 3 in. to 5 in. bore.
3 Alfa-Laval Disc Separators, belt driven, size 45 and 65, with chambers 12 in. and 15 in. dia.
2 unused belt driven Ram Pumps, fitted one ram 1¼ in. dia., 3 in. stroke, brass fitted.
Alpine type Perplex Grinder, chamber 20 in. dia.
Ditto similar, chamber 18 in. dia.
Single pair toothed Crushing Roll, belt and gear driven, last used for soap crystals.
2 Steam Jacketed Mixing Pans.
Several A.C. motors, 3–10 h.p.
21—3 gallon capacity Ball Mills.
4 Mather & Platt Colloid Mills.
460 ft. B.B. Gravity Conveyor, steel rollers, 14 in. long by 6 in. pitch.
Torrance Positive-geared Edge Runner Mill.
Torrance Combination Mill, comprising edge runner, horizontal pug, and granite roller mill.
5 Riveted Vessels, partly jacketed and plain, with agitators and coils, as used in oil-refining trade.
3 Miracle Super Hammer Mills, size 3W, each with 65 H.P. A.C. Motor, vee rope drive, cyclone, fan and all belongings.
2 Various Werner Pfleider Mixers, size 16 and 17, double 'Z' arms, both plain and steam jacketed types.
Gardner Rapid Sifter Mixer, 4 ft. long.
Gardner 10 ft. steam jacketed Dryer.

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SIMON TWIN ROLLER DRUM DRIER, with steam-heated rolls, 2 ft. 4 in. diam. by 5 ft. long; drive through spur gearing with countershaft and complete with fast and loose pulleys.
DITTO by "Milne."
BROADBENT 48-in. SUSPENDED TYPE HYDRO EXTRACTOR, overdriven from 15 h.p. motor, 400/3/50 supply, together with Pony motor for slow running.
BROADBENT 48-in. HYDRO EXTRACTOR, with 48-in. galvanised iron basket, complete as above.
JOHNSON TIMBER PLATE AND FRAME FILTER PRESS, 28 plates and 29 frames, cakes 2 ft. 1 in. sq. by 1½ in. closure. (Two available.)
18-in. diam. WILKINSON OINTMENT MILL, with marble refining discs and enamelled hopper and agitator, and complete with driving motor.
TUNGSTONE ACID PUMPS. A number available in Ebonite, Bronze and Tufnol.
SILICA COILS of 2½ in. bore, comprising 60 ft. formed into seven turns at 2 ft. 6 in. diam., complete with teak supporting framework. (Brand new.)

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TEREBENE (Lewis Berger), 6/- per gallon.
DEOXIDINE (I.C.I.), 5/- per gallon.
Examination welcomed.
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